ANNUAL REPORT OF THE ASSISTANT DIRECTOR 1955-1956

JULY-1956
No.31

Joint Highway Research Project

PURDUE UNIVERSITY
LAFAYETTE INDIANA

by

H.L. Michael

ANNUAL REPORT OF ASSISTANT DIRECTOR, 1955-1956

TO: Professor K. B. Woods, Director
Joint Highway Research Project

July 1, 1956
File: 10-3-6

FROM: Harold L. Michael, Assistant Director

Attached is the 18th in a series of annual reports which have been submitted since 1938 covering the activities of the Joint Highway Research Project. This report covers the period July 1, 1955 to June 30, 1956

Included is a brief description of all the research projects which were active the past year as well as a listing of the reports made to the Board at the eight meetings held. Attendance at Advisory Board Meetings is also enumerated and complete lists of Project staff and extra labor employees are included. New staff members, changes in rank of staff, and resignations are also presented.

The publications of the Project and its staff and their professional activities during the year are discussed. Eight Engineering Reprints covering research performed in the Project were released during the year thus bringing this publication series to No. 114. A listing of theses and papers published during the year is also included.

Some of the outstanding accomplishments during the year have been completion of the county drainage mapping program, major activity on a State Highway Needs Study of Indiana, construction of a BPR Roughometer, development of photogrammetric mapping, completion of research projects by eleven degree candidates, and development of a structural section for research within the Project. These and the many individuals associated with the Project contributed to the success of the year's activities.

Respectfully submitted,

Harold L. Michael

Harold L. Michael, Assistant Director
Joint Highway Research Project

HLM:br
Attachment
cc: D. S. Berry
J. R. Cooper
J. T. Hallett
F. F. Havey
G. A. Hawkins
G. A. Leonards
B. B. Lewis
R. E. Mills
B. H. Petty
Lloyd Poindexter
C. E. Vogelgesang
J. L. Waling
A. K. Branham
D. O. Covault
W. L. Dolch
W. H. Goetz
F. H. Green
M. J. Gutzwiler
C. W. Lovell, Jr.
J. F. McLaughlin
R. D. Miles
G. M. Nordby
Merle Parvis
L. E. Wood
P. T. Yeh
E. J. Yoder

INDEX

ANNUAL REPORT OF THE ASSISTANT DIRECTOR

RESEARCHES OF THE JOINT HIGHWAY RESEARCH PROJECT

The Joint Highway Research Project in the School of Civil Engineering is organized to do cooperative research with the State Highway Department of Indiana. Research was initiated on June 1, 1936, and formally authorized by an act of the Indiana State Legislature on March 11, 1937, and amended March, 1949. The purpose of this organization is to make basic studies of materials used in highways; to facilitate economical design, construction, and maintenance of county and state highways; to investigate traffic, safety, and economics; to provide advanced instruction in the fundamentals of highway engineering and related research; and to provide practical experience in construction and maintenance procedures and use of highway materials. The Project is guided by an Advisory Board consisting of members of the State Highway Department and the School of Civil Engineering at Purdue University.

Sponsored research in the field of highway engineering is also conducted by this organization and several such projects were active during the past year.

The research conducted during the year in the eight laboratories of the Project for the State Highway Department was varied and important. A total of 43 different research studies were in progress with 15 of these completed and 8 initiated. Sixty-seven formal reports were presented to the Advisory Board during the year of which 39 were detailed reports of research conducted and seven were working plans for new or continued research. The Board received and accepted 2271 pages of information during the year. Titles of the various reports, together with other pertinent information, is given in another section of this report.

During the year a large number of the staff accepted positions in other locations that were connected with the field of highways. Several former members are with the Illinois Test Road and actively engaged in that important research project. A number of others accepted positions with the new Airphoto Laboratory of the Snow, Ice, and Permafrost Establishment of the Corps of Engineers. Eighteen members of the Project staff were awarded degrees following completion of the requirements during the year.

Outstanding among honors and recognition that were received during the year by various staff members was the selection of the Director of the Project, K. B. Woods, as Chairman of the Highway Research Board.

Research in the structural area was expanded during the year by the formation of a section in structures under Prof. J. L. Waling. Three projects have already been initiated, using Project funds, in this area.

A Bureau of Public Roads Roughometer was constructed during the year, thereby climaxing many discussions at the Advisory Board on this subject. A Kelsh Plotter was also ordered and is scheduled to be placed in operation in the Airphoto Laboratory early in the coming year.

The Needs Study continued as a major activity of the Project. This study is of major interest to the people of Indiana and the results are being made available to the Indiana Highway Study Commission. The results of the study are especially important at this time due to the passage of the new Federal highway program and the impending meeting of the State Legislature.

After ten years the drainage mapping program reached its first goal- the completion of a drainage map for each county in Indiana. The first map - Fountain County - was presented to the Board on July 24, 1946. The 92nd map - Marshall County - will be presented to the Board on July

26, 1956. An atlas of all 92 maps was approved during the year and is currently active.

Other large and important studies that were active during the year included research on base courses, deflection of rigid pavements, stability of bituminous mixtures, and durability of aggregates.

Highway and traffic extension activities also increased during the year. A very successful Road School was held April 2-5, 1956 under the direction of Professor Petty. Over one thousand persons were in attendance for an outstanding program and Road Show. Advice and counsel to county road men continued to be active and many counties expressed interest in road classification studies. Advice and counsel to cities on traffic problems also constituted an important part of the year's activities.

A short discussion of each of the active projects during the past year follows:

SOILS RESEARCH

Field Soil Temperature Measurements. (C-36-16B)

Investigators: E. J. Yoder

The factors effecting soil temperature are the basis of this study. Field measurements of soil temperature under a flexible type pavement are also included.

Subsurface Exploration by Resistivity Methods. (C-36-36E)

Investigators: D. G. Shurig under direction of E. J. Yoder

The economics of resistivity methods compared to sample spoon, drive, and power augering methods for soil exploration are the subject of this research. Data from the construction of portions of the Pennsylvania Turnpike are being utilized for the economics comparison.

Performance of Concrete Pavements on Base Courses. (C-36-45F)

Investigators: E. J. Yoder and J. R. Shepard

A survey of the performance of concrete pavements built on base courses, the effect of age, depth of treatment, type of base and soil type on performance. All pavements in Indiana that have base courses are included in the study and various tests are in progress in the hope that some information as to the causes of failure in pavements on such bases can be evaluated.

Calibration and Use of Electrical Resistivity Moisture Cells. (C-36-16C)

Investigators: C. W. Lovell, Jr.

A study initiated to investigate calibration and usage of electrical resistance moisture cells, particularly the Colman fiberglas and Bouyoucos nylon units. Limited field installation for work with field calibration methods and operational characteristics. Development of laboratory calibration methods. The following factors relative to cell calibration are being investigated: (1) comparison of field and laboratory calibration of same soil; (2) effect of variable density on cell reading; (3) relationship of one cell reading to another under same conditions.

CONCRETE MATERIALS AND RIGID PAVEMENT RESEARCH

Measurement of Strains in Concrete Pavements. (C-36-46K)

Investigators: E. C. Thoma and J. F. McLaughlin

This investigation is a study of measurement of strains in concrete pavement due to traffic loads by means of SR-4 gages embedded in the concrete at the time of construction. Measurements are made periodically at two sites in Indiana.

Determination of Air Content of Hardened Concrete. (C-36-37Q)

Investigators: F. K. Fears under direction of J. F. McLaughlin and D. W. Lewis

This study is an investigation of the air contents of hardened concretes by the linear traverse method, in order to determine the effects of amount of air and bubble spacing on durability in laboratory and field weathering. The preparation of a report on this study is now in progress.

HRB Cooperative Study of Concrete Freezing and Thawing. (C-36-37U)

Investigators: D. W. Lewis and J. B. Blackburn

Participation in a cooperative investigation of freezing and thawing tests on concrete, set up by Highway Research Board Committee B-1, Durability of Concrete, Physical Aspects was the basis of this study. Purpose of the study is to determine the characteristics and variability of freezing and thawing methods and equipment.

Effect of Heavy Media Separation and Addition of Crushed Stone on Durability of Gravel Aggregates. (C-36-37T)

Investigators: R. D. Walker under direction of D. W. Lewis and J. F. McLaughlin

This study is a determination of the effects on durability of gravel aggregates subjected to freezing and thawing in concrete of the removal of lightweight particles and "sweetening" with crushed stone. The project was completed and a report has been presented to the Highway Research Board.

Investigation of Durability of Slag Cement. (C-36-57A)

Investigators: J. B. Blackburn

A comparison of Portland and Portland-slag cement in freezing-thawing of concrete was the basis of the project.

Evaluation of Aggregate Durability by Freezing and Thawing Tests of Concrete

Investigators: J. F. McLaughlin (C-36-37F)

A project consisting of the testing of aggregates in concrete subjected to freezing and thawing in automatic equipment. Aggregates from many sources are to be tested to obtain information helpful in setting up specification for freezing and thawing tests of concrete.

This investigation also includes various studies of factors affecting concrete durability, such as maximum aggregate size and w/c ratio. Studies of variations in test method for freezing and thawing tests, such as the use of aluminum foil for wrapping beams, etc. are included.

A Study of Variability of Laboratory Freeze-Thaw Test Data. (C-36-37S)

Investigators: J. B. Blackburn, D. W. Lewis, P. E. Irick

This investigation was a study of the causes of within-mix and between-mix variability of resistance to laboratory freeze-thaw testing of small-size concrete specimens. The project was completed in 1955 and several reports have been issued.

Durability of Pre-Stressed Concrete. (C-36-37V)

Investigators: J. F. McLaughlin and G. E. Nordby

This project is a study of the durability of pre-stressed concrete beams exposed to freezing and thawing. A comparison will be made between laboratory freeze-thaw durability of plain and pre-stressed concretes made with aggregates of poor and good quality.

Durability and Deterioration of Structural Concrete. (C-36-37R)

Investigators: J. F. McLaughlin and D. W. Lewis

A field study of structures to determine the scope of the problem of concrete deterioration and the probable causes. The present phase is concentrated on new structures in which air-entrained concrete was used.

Field Survey of Air-Entrained Concrete Pavements. (C-36-37W)

Investigators: J. F. McLaughlin

This project is a condition survey of concrete pavements built since the introduction of air-entrained concrete for Indiana roads. The survey is being conducted as the field phase of the evaluation of aggregate durability to obtain information helpful in setting up specification tests based on freezing and thawing of concrete

BITUMINOUS MATERIALS AND FLEXIBLE PAVEMENT RESEARCH

Strength and Deformation Characteristics of Bituminous Mixtures. (C-36-6J)

Investigators: L. E. Wood under direction of W. H. Goetz

The strength and deformation characteristics of various bituminous mixtures are being studied at several temperatures by means of the unconfined compression test using different rates of deformation, a static load test, and repetitive load test. A progress report was presented to the Highway Research Board in January 1956 and a more detailed report is expected in August 1956.

Bituminous Resurfacing Mixtures. (C-36-31E)

Investigators: J. F. McLaughlin under direction of W. H. Goetz

Laboratory and field studies are being made of bituminous resurfacing mixtures. Field sampling for laboratory density and Marshall tests are included. Causes of failure have been investigated by various methods in this continuing study in an attempt to evaluate data that will help produce the most satisfactory resurfacing mixtures.

Flexible Pavement Performance. (C-36-55A)

Investigators: J. F. McLaughlin under direction of W. H. Goetz

Field and laboratory tests have been conducted to determine the cause of rutting in flexible pavements. Trenches were dug across pavements and measurements of deformation were made on individual components of the layered system. Density and in place CBR tests were also made and correlated with laboratory stability measurements.

Triaxial Testing of Bituminous Mixtures at High Confining Pressures. (C-36-6K)

Investigators: J. C. Oppenlander under direction of W. H. Goetz

The purpose of this study is to determine the stability of bituminous mixtures, "open" and "one-size" aggregate gradations by utilizing the rational triaxial test with a considerable range of confining pressures. Tests are also to include the testing of irrational specimens.

Sonic Test for the Evaluation of Stripping Resistance. (C-36-8C)

Investigators: O. B. Anderaland under direction of W. H. Goetz

A study of the application of Sonic Testing for the evaluation of stripping resistance in compacted bituminous mixtures exposed to water. The sonic test results were correlated with the immersion-compression test and the visual stripping test. A report on this completed project is available.

CHEMISTRY OF MATERIALS RESEARCH

Porosity Characteristics of Aggregates. (C-36-47F)

Investigators: W. L. Dolch

A project comprising studies of pore structure of limestone aggregates by measurement of porosity, permeability, absorptivity, saturation, tortuosity, and specific surface.

AIRPHOTO INTERPRETATION RESEARCH

Use of Airphotos to Predict Sub-Surface Conditions. (C-36-36F)

Investigators: B. Moore under direction of R. E. Frost and R. D. Miles

A project to determine the extent to which airphotos can be used in obtaining information about subsurface conditions for use in foundation studies of structures. Airphoto predictions were correlated with field observations and data obtained in connection with the Indiana Toll Road. A final report will be issued early in fiscal year 1957.

Granular Material Study Using Airphotos. (C-36-51H)

Investigators: R. Leighty under direction of R. E. Frost and R. D. Miles

A study to determine identifying characteristics of granular patterns and development of statistical photo-field-lab sampling procedures for the purpose of determining the extent to which airphotos can be used in establishing physical characteristics of alluvial gravels. This study was nearly complete by July 1956.

Indiana Engineering Soils Mapping Program. (C-36-51B)

Investigators: P. T. Yeh

The object of this project is twofold: First, to investigate and to develop the airphoto patterns of different types of engineering soils in Indiana; Second, to obtain a complete engineering soils map for the state. Soils of different engineering characteristics are mapped exclusively from airphotos on a regional basis or on a county basis. Only very limited

field investigations are conducted to secure representative soil samples and to field check the soil interpretations. About one-half of the state has been mapped in this study.

Engineering Interpretation of Agricultural Soil Maps. (C-36-51I)

Investigators: D. D. McGregor under direction of R. D. Miles

A project to determine whether agricultural soils data correlated with airphotos would provide a faster and more economical means of completing the engineering soils mapping program in Indiana than the methods now in use. The study was completed in June 1956 and indicated that good possibilities existed to accelerate the soils mapping program.

Photogrammetric Mapping of Bridge Sites. (C-36-32L)

Investigators: R. D. Miles

A study of the use of a Kelsh Plotter and photogrammetric techniques in the preparation of large scale topographic maps of individual bridge sites. The Kelsh Plotter will be installed in July-August 1956 and actual bridge site will be investigated.

State Drainage Map. (C-36-57J)

Investigators: P. T. Yeh

A project undertaken to prepare a State drainage map, utilizing the individual detailed county maps already prepared. This project is about one-half complete.

County Drainage Maps from Airphotos. (C-36-51A)

Investigators: Merle Parvis and P. T. Yeh

Drainage maps are made to a scale of one inch equals one mile on base maps prepared from the 1937 "General Highway and Transportation Maps." With the aid of stereoscopes all discernible drainageways are first marked with crayon on the odd-numbered airphotos. This drainage information is then transferred from the prints by reflectoscope to the base maps. Cloth tracings are made. Maps have been made for all 92 counties in Indiana with the final one completed in June 1956. It is now planned to prepare an atlas comprising all 92 maps.

ECONOMICS, ADMINISTRATION, AND FINANCE RESEARCH

Classification and Evaluation of Indiana Rural County Roads. (C-36-54E)

Investigators: J. E. Baerwald and R. J. Hennings under direction of H. L. Michael

Techniques for the classification and evaluation of Indiana rural county roads have been developed. Procedures for road identification, traffic studies, land use, road inventory, and road rating are included. Design standards for such roads are in the process of development. One county study has been completed and a second one is in progress.

County Highway Administration. (C-36-54N)

Investigator: John E. Stoner

County highway administration practices in three abutting counties--one each in Indiana, Michigan, and Ohio--were studied. Historical background, present administration structure and procedure, and a comparative analysis were made. The project was completed and a report issued in July, 1955.

TRAFFIC AND SAFETY RESEARCH

The Use of Urban Characteristics in Estimating Travel Patterns. (C-36-54V)

Investigators: J. W. Barr under direction of H. L. Michael

Urban characteristics such as land use, economic condition, growth, motorist characteristics, and population characteristics were used to predict the desired pattern of travel in a community. The various factors and their relationships to travel patterns were studied by using two cities with known travel patterns as obtained from conventional origin-destination studies. The appropriate factors were then used in predicting the travel pattern in a third city and the resulting travel pattern was compared with the known pattern as obtained from an origin-destination study. The results indicated that possibilities existed for the determination of travel patterns from urban factors.

Rural Motor Vehicle Speeds. (C-3c-100)

Investigators: J. E. Baerwald, J. W. Barr, F. M. Holloway, and R. J. Henning under the direction of H. L. Michael

Field investigations of free moving vehicles at two 4-lane divided and four 2-lane rural locations are conducted semi-annually in northwestern Indiana. Various types of vehicles are observed in these studies. In addition truck speeds are obtained and correlated with truck weights during August of each year at ten other locations in the state. Purpose is the determination of speed trends.

Driver Observance of Traffic Signs. (C-36-170)

Investigators: W. T. Jackman under the direction of H. L. Michael

Driver observance to stop signs of various colors and at two heights were studied for determining criteria for sign and location characteristics that improve driver observance. The red stop signs as well as those with the conventional yellow background were included. Another portion of the study was concerned with driver observance to speed limit signs in unwarranted locations. This study was completed in January 1956 and a report issued.

Lateral Placement of Vehicles. (C-36-17L)

Investigators: David Rosenfield under direction of H. L. Michael

This investigation was to determine the effect of various factors on the lateral position at which motorists drive their automobiles on the highway. Factors such as center striping, type of surface, shoulder condition, and edge striping were included. A comparison of the lateral placement on Portland Cement Concrete and Bituminous Concrete is included in the report that was issued in September 1955.

The Scramble System of Traffic Light Signalization. (C-36-17P)

Investigators: D. Rosenfield and J. W. Barr under direction of H. L. Michael

Before and after studies were made at three intersections where these special pedestrian signals were installed. The effects on travel times as well as capacity were measured for both pedestrians and traffic. Factors that caused the various effects were analyzed and some criteria were suggested for warrants for such signals. The study was completed late in 1955.

STRUCTURES RESEARCH

Stresses and Deflections in Plain the Reinforced Concrete. (C-36-46M)

Investigators: M. M. Miller, Jr., under direction of M. J. Gutzwiller

The purposes of the project are: (1) to obtain a concise summary of the existing knowledge regarding stresses and deflections in plain and reinforced concrete pavements; (2) to evaluate the existing theories concerning stresses and deflections in plain and reinforced concrete pavements by studying their assumptions and limitations, and to attempt to determine analytically the stresses and deflections in continuously reinforced concrete pavements.

Effect of Air-Entrainment upon the Endurance on Concrete under Fatigue Loading. (C-36-58B)

Investigators: G. M. Nordby, A. D. M. Lewis, J. F. McLaughlin

A series of 3" by 6" concrete cylinders, air-entrained and non-air-entrained, are to be given repetitive loads at various intensities of load and the results are to be compared to see if air-entrainment has any effect on the endurance of the concrete.

Creep and Shrinkage Strains in Prestressed Concrete Using Two Typical Indiana Aggregates. (C-36-58A)

Investigators: E. J. Midgaard under direction of G. M. Nordby

Eight prestressed concrete beams, 6" x 12" in cross-section, are to be prestressed using steel strand of 3/8" and 1/2" diameters, as the prestressing medium. Creep and shrinkage measurements will be taken for a long period of time (2 years). Beams will later be given a static test.

GENERAL TRANSPORTATION

Relative Support Characteristics of Nine Subgrade Treatments. (C-36-A)

Investigators: R. C. Goldmacher, R. L. Anderson, and J. W. Dunkin

This study is an attempt to establish a criteria for the relative support characteristics of concrete highway sub-base sub-grade systems in terms of elastic and damping constants and to apply such a criteria to nine sections of U. S. Highway 41 near Cook, Indiana. Theoretical considerations have been based upon treating the highway as a plate resting on a damped elastic foundation. A multi-channel recording unit has been designed and built and dynamic pavement deflections have been measured using this instrument in conjunction with differential transformers as transducers. Final report will be available at an early date.

Road Roughness. (C-36-53I)

Investigators: F. M. Holloway under direction of H. L. Michael

This project has included the development of an electronic recording unit that records the relative motion between the wheel and frame of a

Bureau of Public Roads Road Roughness Device. An audio frequency oscillator whose frequency is varied in accordance with road surface irregularities is the basis of the recording equipment. A Bureau of Public Roads Road Roughness Device has also been completed and a study of the road roughness characteristics of Portland Cement Concrete pavements has been initiated. Road Roughness characteristics of bituminous surfaces is also presently under study.

State Highway Needs in Indiana. (C-36-54T)

Investigators: H. L. Michael, A. K. Branham, D. O. Covault, J. E. Baerwald

An inventory was conducted of the entire state highway system and the adequacy and needs of this system are being determined by comparison with the standards necessary to maintain adequate traffic movement. Traffic to be carried, land use, accident record, capacity, and service performed by the highway are being evaluated and a program of improvement for the highways is to be developed. The needs of counties and cities have also been studied. The needs will then be translated into dollars and these needs presented to the people of Indiana for their consideration. A Progress Report of this study was issued in June 1956.

Skid Resistance of Highway Surfaces. (C-36-53G)

Investigators: D. L. Grunau and J. W. Barr under direction of H. L. Michael

The various factors that affect skid characteristics of pavements were sought and attempts were made to evaluate some of them. Skid characteristics of various surfaces were compared and "slick" pavements in the state were located and the proper highway officials were notified. Special skid equipment of a semi-automatic nature was developed and used on this study. Several reports of this study have been issued and are available.

Skid Characteristics of U. S. 31 West Road. (C-36-53E)

Investigators: F. M. Holloway and D. L. Grunau under direction of H. L. Michael

In conjunction with the State Highway Department a long term study of the skid characteristics of a Portland Cement Concrete pavement and an adjoining Bituminous Concrete pavement is in progress. Skid tests are performed semi-annually, winter and summer, and the changes in skidding characteristics are evaluated.

Skid Characteristics of a Silica Sand Pavement Surface. (C-36-53F)

Investigators: F. M. Holloway under the direction of H. L. Michael

An experimental silica sand surface was placed on a state highway in southern Indiana in recent years and this project was established to study its skid characteristics. Once each year skid tests at various speeds are conducted on this surface and on an adjoining bituminous concrete surface. A comparison of the skid characteristics as well as their trend is then evaluated.

TRAFFIC ENGINEERING SERVICES

Traffic Engineering Services (C-138)

In 1953 a unit known as Traffic Engineering Services Unit was organized within the Joint Highway Research Project to provide traffic and transportation engineering services for the city and county governmental units of Indiana. The services offered are primarily of advice and counsel on traffic and highway problems on an extension basis. Arrangements may also be made, however, for this Unit to supervise and assist in the conduct and

analysis of traffic and highway studies with the cost borne by the governmental unit concerned. The activity of the Unit during the past year has been as follows.

Item No.	Governmental Unit	Services Rendered	Status
1	Terre Haute	Advice and counsel on the traffic movement and parking needs of the city. One meeting was held with citizens of city.	Inactive
2	West Lafayette	Advice and counsel on the traffic problems and parking needs of the city. Numerous meetings held with Citizens Committee and city officials.	Active
3	Crown Point	Advice and counsel on a thoroughfare plan and a parking plan for the city. Supervision of a parking and volume count study of the city was provided. Analysis of studies now are under way.	Active
4	Dubois County	A county road classification study is in progress under the direction of the county engineer. An inventory and needs of the county primary and secondary system will be made. Advice, counsel, anaylsis of data, and preparation of report are provided by Purdue.	Active
5	Crawfordsville	Advice and counsel to city officials for conduct of studies recommended for city in its position as a pilot city of the National Committee on Urban Transportation. Studies of traffic and street services are in progress and research on these studies in addition to assistance to Crawfordsville is being made.	Active
6	Carroll County	Two discussions on the classification of their county roads were held with county officials. An estimate of cost was given to them but no follow-up has been received.	Inactive
7	Seymour	Correspondence with city officials concerning advice on traffic problems did not result in any activity in city.	Inactive

Item No.	Governmental Unit	Services Rendered	Status
8	Noblesville	Correspondence with city officials concerning traffic problem resulted in city obtaining planning consultants to study their problem.	Complete
9	Marion	Discussions on traffic problems in city initiated in late June.	Active

The prodedure for a city or county to obtain the services of the Unit are well established and all inquiries for services to date have been quickly fulfilled. Acceptance of some of the services has been rejected in a few cases where the city did not wish to expend the funds required. Inquiries for information on the county road classification studies have been received from about 15 additional counties in the state. A discussion of these studies was mailed to each of them but nothing but interest has thus far developed.

PERSONNEL OF JOINT HIGHWAY RESEARCH PROJECT

June 30, 1956

Advisory Board

C. E. Vogelgesang (State Highway Department of Indiana), Chairman

J. R. Cooper (State Highway Department of Indiana)

J. T. Hallett (State Highway Department of Indiana)

F. F. Havey (State Highway Department of Indiana)

Lloyd Poindexter (State Highway Department of Indiana)

K. B. Woods (Purdue), Vice-Chairman

*G. A. Leonards (Purdue)

B. B. Lewis (Purdue)

R. E. Mills (Purdue)

B. H. Petty (Purdue)

**J. L. Waling (Purdue)

***H. L. Michael (Purdue), Secretary

* Prof. Leonards replaced Prof. Chenea, effective July 1, 1955.

** Prof. Waling replaced Prof. Hayes, effective July 1, 1955.

*** Non-voting member.

RECORD OF MEETINGS AND ATTENDANCE

THE JOINT HIGHWAY RESEARCH PROJECT ADVISORY BOARD July 1, 1955 - June 30, 1956

Meeting No.	158	159	160	161	162	163	164	165	Total	
Members	July 13	Sept. 21	Oct. 18	Dec. 13	Feb. 1 (4)	Mar. 13	Apr. 19 (5)	June 11	Present	Absent
J. R. Cooper	X	X	X	X	X	X	X	X	80	8
J. T. Hallett	X	X	X	a	X	X	X	X	88	6
F. F. Havey	X	X	a	X	X	X	X	X	124	7
G. A. Leonards (1)	X	X	X	X	X	X	X	X	8	0
B. B. Lewis	X	X	X	X	X	X	a	a	15	2
R. E. Mills	X	X	X	X	X	X	X	X	44	1
B. H. Petty	X	X	X	X	X	a	X	a	130	19
Lloyd Poindexter	X	X	a	X	X	X	a	a	6	3
C. E. Vogelgesang (Chm)	X	X	X	X	X	X	X	X	81	0
J. L. Waling (2)	a	X	X	X	X	X	X	X	7	1
K. B. Woods (V. Chm)	X	X	X	X	X	X	X	X	148	0
H. L. Michael (3)(Sec'y)	X	X	X	X	X	X	X	X	16	0

(1) Appointed to replace Prof. P.F. Chenea.
(2) Appointed to replace Prof. J.M. Hayes.
(3) Non-voting member.
(4) Guest: Dr. D. S. Berry.
(5) Guests: Messrs. S. P. Clay, Jr., V. A. Eichhorn, C. M. Maddox, L. A. Meagher, W. T. Spencer.

Research Staff

Director

K. B. Woods

Assistant Director

H. L. Michael

Highway Specialist

B. H. Petty

Research Engineers

D. O. Cornell (Traffic)

R. G. Goldmacher (In Charge, Pavement Deflection)

W. H. Goetz (In Charge, Bituminous)

F. N. Green (In Charge, Traffic)

J. F. McLaughlin (In Charge, Concrete)

R. D. Miles (In Charge, Airphoto)

Merle Parvis (Airphoto)

L. E. Wood (Bituminous)

P. T. Yeh (Airphoto)

E. J. Yoder (In Charge, Soils)

Research Associate

A. K. Branham (In Charge, Economics)

Research Assistants

R. L. Anderson (Pavement Deflection)

W. P. Chamberlin (Soils)

W. L. Dolch (In Charge, Chemistry)

J. W. Dunkin (Pavement Deflection)

M. E. Harr (Pavement Deflection)

D. G. Shurig (Soils, Concrete)

Graduate Assistants

D. H. Alcock	(Soils)	E. J. Midgaard	(Structures)
C. Ioakimidis	(Concrete)	H. M. Miller, Jr.	(Structures)
Mart Kask	(Traffic)	J. C. Oppenlander	(Bituminous)
K. E. McNaughton	(Traffic)		

Service

E. L. Black (Photographer)

R. J. Manning (Laboratory Assistant)

W. S. Luttrell (Shop)

S. E. McLaughlin (Duplicating)

J. A. Sutton (Laboratory Assistant)

Clerical

Beverlee Deardorff (Clerk-Typist)

Margaret English (Purchasing)

Edna Liu (Typist)

Date of Appointment of Present Staff

Name	Present Title	Appointed
Alcock, D. H.	Graduate Assistant	June 1, 1956
Anderson, R. L. (1)	Research Assistant	October 16, 1953
* Black, E. L.	Laboratory Technician	November 1, 1953
Branham, A. K.	Research Associate	September 1, 1939 (A)
Chamberlin, W. P.	Research Assistant	September 1, 1955
Covault, D. O.	Research Engineer	September 22, 1955
Deardorff, Beverlee	Clerk-Typist	October 1, 1955
* Dolch, W. L.	Research Assistant	September 15, 1947
Dunkin, J. W.	Research Assistant	July 1, 1954
English, Margaret	Clerk-Typist	September 6, 1955
Goldmacher, R. C. (2)	Research Engineer	October 16, 1953
Goetz, W. H. (2)	Research Engineer	May 13, 1938
Green, F. H. (2)	Research Engineer	February 1, 1945
Harr, M. E.	Research Assistant	February 1, 1956
Henning, R. J.	Laboratory Assistant	June 1, 1956
Ioakimidis, C.	Graduate Assistant	June 1, 1956
Kask, Mart	Graduate Assistant	June 11, 1956
Liu, Edna	Typist	September 1, 1955
Luttrell, W. B.	Laboratory Assistant	August 6, 1938
McLaughlin, J. F.	Research Engineer	September 1, 1950
* McLaughlin, S. B.	Topographical Draftsman	December 1, 1953
McNaughton, K. E.	Graduate Assistant	June 11, 1956

Name	Present Title	Appointed
Michael, H. L. (1)	Assistant Director	February 1, 1950
Midgaard, E. J.	Graduate Assistant	September 1, 1955
Miles, R. D. (1)	Research Engineer	September 1, 1949
Miller, M. M. Jr.	Graduate Assistant	September 1, 1955
Oppenlander, J. C.	Graduate Assistant	September 1, 1955
Parvis, Merle (2)	Research Engineer	March 1, 1946
Petty, B. H. (3)	Highway Specialist	July 1, 1936
Shurig, D. G.	Research Assistant	February 1, 1955
Sutton, J. A.	Laboratory Assistant	June 1, 1956
Wood, L. E.	Research Engineer	September 1, 1953
Woods, K. B. (3)	Director	February 1, 1939
* Yeh, P. T.	Research Engineer	February 1, 1953
* Yoder, E. J. (2)	Research Engineer	September 1, 1949 (B)

* See also list of extra labor personnel in Annual Report for 1953-54, Supplement No. 1 in Annual Report for 1954-55, and Supplement No. 2 in this report.

(1) Assistant Professor
(2) Associate Professor
(3) Professor

(A) Resigned August 18, 1941 and reappointed August 1, 1949.
(B) Resigned December 31, 1947 and reappointed September 1, 1949.

NEW STAFF MEMBERS DURING PAST YEAR

Name	Rank	Degree Held	School	Date Appointed
Alcock, D. H.	Graduate Assistant	BS, 1955	Alabama Polytechnic Inst.	June 1, 1956
Chamberlin, W. P.	Research Assistant	BS, 195[illegible]	University of Maryland	September 1, 1956
Covault, D. O.	Research Engineer	BSCE, 1948 MSCE, 1950	Purdue University Purdue University	September 22, 1955
Harr, M. E.	Research Assistant	BS, 1949 MS, 1955	Northeastern University Rutgers University	February 1, 1956
Ioakimidis, C.	Graduate Assistant	BSCE, 1952	National Technical University of Athens, Greece	June 1, 1956
Kask, Mart	Graduate Assistant	BSCE, 1956	St. Martins College	June 11, 1956
McGregor, D. D.	Graduate Assistant	BS, 1952	Clemson College	February 1, 1956
* McLerran, J. H.	Research Engineer	BSCE, 1950 MSCE, 1952	Washington State College Purdue University	February 1, 1956
McNaughton, K. E.	Graduate Assistant	BCE, 1956	University of Detroit	June 11, 1956
Midgaard, E. J.	Graduate Assistant	CE, 1952	Norway Inst. of Technology	September 1, 1955
Miller, M. M. Jr.	Graduate Assistant	BSCE, 1955	University of Vermont	September 1, 1955

* This is a reappointment; Mr. McLerran was last on the staff September 1, 1950 to January 31, 1952.

Name	Rank	Degree Held	School	Date Appointed
Oppenlander, J. C.	Graduate Assistant	BSCE, 1953	Case Inst. of Technology	September 1, 1955
Sanborn, A. F. III	Graduate Assistant	BSCE, 1952	Michigan College of Mining and Technology	September 16, 1955
Deardorff, Beverlee	Clerk-Typist			October 1, 1955
Dwyer, Angeletta	Clerk-Stenographer			September 20, 1955
English, Margaret	Clerk-Typist			September 6, 1955
Gardner, Carolyn	Stenographer			September 6, 1955
Henning, R. J.	Laboratory Assistant			June 1, 1956
Liu, Edna	Typist			September 1, 1955
Sutton, J. A.	Laboratory Assistant			June 1, 1956

STAFF RESIGNATIONS DURING THE PAST YEAR*

July 1, 1955 to June 30, 1956

Name	Title	Degrees Held	School	Appointed	Resigned
Andersland, O. B.	Graduate Assistant	BCE, 1952 MSCE, 1956	University of Minnesota Purdue University	2/1/55	2/29/56
Baerwald, J. E.	Research Engineer	BSCE, 1949 MSCE, 1950 Ph.D., 1955	Purdue University Purdue University Purdue University	7/1/49	9/30/55
Barr, J. W.	Graduate Assistant	BSCE, 1952 MSCE, 1956	Purdue University Purdue University	7/1/55	12/31/55
Bell, J. R.	Graduate Assistant	BSCE, 1952 MSCE, 1956	Purdue University Purdue University	9/16/54	6/30/56
Blackburn, J. B.	Research Engineer	BSCE, 1947 MSCE, 1949 Ph.D., 1955	Oklahoma University Purdue University Purdue University	2/1/48	8/6/55
Fears, F. K.	Graduate Assistant	BSCE, 1943 MSCE, 1950	University of Oklahoma Purdue University	6/1/55	8/31/55
Frost, R. E. 2/	Research Engineer	BSCE, 1940 MSCE, 1942 CE, 1946	Purdue University Purdue University Purdue University	2/1/40	4/16/56
Havers, J. A.	Research Engineer	BSCE, 1947 MSCE, 1952 Ph.D., 1956	Saskatchewan (Canada) Purdue University Purdue University	9/21/53	6/30/56
Holloway, F. M.	Research Engineer	BSCE, 1950 MSCE, 1956	Purdue University Purdue University	6/1/54	6/30/56

Name	Title	Degrees Held	School	Appointed	Resigned
Irick, P. E. 2/	Research Associate	BS, 1940 BS Ed., 1945 Ph.D., 1950	Purdue University Purdue University Purdue University	6/1/53	6/30/56
Jackman, W. T.	Graduate Assistant	BS, 1954 MSCE, 1956	Case Inst. of Technology Purdue University	9/16/54	1/31/56
Johnstone, J. G. 1/	Research Engineer	[illegible]	[illegible]	[illegible]	[illegible]
Leighty, R. D.	Graduate Assistant	[illegible] MSCE, 1956	[illegible] Purdue University	[illegible]	[illegible]
Lewis, D. W. 2/	Research Engineer	[illegible] MSCE, 1942	[illegible] Purdue University	[illegible]	[illegible]
Lottman, R. P.	Graduate Fellow	[illegible] MSCE, 1956	[illegible] Purdue University	[illegible]	[illegible]
Lovell, C. W.	Research Engineer	MCE, 1944 MSCE, 1951	University of [illegible] Purdue University	[illegible]	[illegible]
Mann, G. D.	Graduate Assistant	BME, 1952 MSCE, 1956	North Carolina State Purdue University	[illegible]	[illegible]
McGregor, D. D.	Graduate Assistant	BS, 1952 MSCE, 1956	Clemson College Purdue University	[illegible]	[illegible]
McLarnan, J. H.	Research Engineer	BSCE, 1950 MSCE, 1952	Washington State College Purdue University	[illegible]	[illegible]
Mattos, L. W.	Research Engineer	BSCE, 1950	Purdue University	[illegible]	[illegible]

Name	Title	Degrees Held	School	Appointed	Resigned
Moore, Bruce	Graduate Assistant	BSCE, 1950 MSCE, 1956	Tufts College Purdue University	2/1/55	6/30/56
Poulin, Ambrose	Graduate Assistant	BSCE, 1952 MSCE, 1956	Marquette University Purdue University	2/1/54	9/30/55
Robbins, G. P.	Graduate Assistant	BSCE, 1954	Purdue University	2/1/54	8/16/55
Rosenfield, David	Graduate Assistant	BSCE, 1950 MSCE, 1955	University of Rhode Island Purdue University	2/1/54	6/31/55
Sanborn, A. F. III	Graduate Assistant	BSCE, 1952 MSCE, 1956	Michigan College of Mining and Technology Purdue University	9/16/55	6/30/56
Shepard, J. R.	Research Engineer	BSCE, 1949 MSCE, 1951	Purdue University Purdue University	2/1/49	6/29/54
Snyder, J. W.	Research Assistant	BSCE, 1951	Purdue University	9/1/53	8/31/55
Venters, Eduards	Research Engineer	MSCE, 1951	Purdue University	2/1/50	8/9/55

Name	Title	Degrees Held	School	Appointed	Resigned
Blain, Edna	Clerk-Typist			6/1/55	9/30/55
Dwyer, Angeletta	Clerk-Stenographer			9/20/55	6/18/56
Gardner, Carolyn	Stenographer			9/6/55	6/30/56
Kingma, Loretta	Clerk-Typist			6/6/55	12/31/55
Stewart, Lucille	Clerk-Stenographer			6/27/55	7/30/55

1/ Rank of Assistant Professor

2/ Rank of Associate Professor

* For a summary of staff resignations from June 1, 1936 to June 30, 1955, see the Annual Report of the Assistant Director, 1954-55.

CHANGES IN RANK OR TITLE

Name	Old Title	Present Title	Effective Date	Degree	School	Date
Irick, P. E.	Asst. Prof. and Research Assoc.	Assoc. Prof. and Research Assoc.	July 1, 1955	BS BS Ed. Ph.D.	Purdue Univ. Purdue Univ. Purdue Univ.	1940 1945 1950
Shurig, D. G.	Graduate Asst.	Research Asst.	February 1, 1956	CE	Washington Univ.	1948
Wood, L. E	Graduate Asst.	Research Engineer	July 1, 1955	BS MS	Kansas State Coll. Kansas State Coll.	1948 1949

STAFF ACTIVITIES DURING PAST YEAR

A. K. Branham, Research Associate, presented papers "Background to Grants in Aid for Highways" Panel Discussion 7th Workshop in State and Local Government, Indiana University, July; "Road Marking and Preferential Roads" County Officials, Miami County, Peru, Indiana, May; and "Progress Report No. 4. "A Study of State Highway Needs in Indiana" (with H. L. Michael and D. O. Covault) 42nd Annual Road School, Purdue University. Mr. Branham along with K. B. Woods published "Roads and Streets" in the New International Yearbook, Events of 1955 by Funk & Wagnalls Co., New York, N. Y. He was author of "County Road Identification and Numbering of Rural Residences", Public Works June, 1956.

Mr. Branham attended the 35th Annual Meeting of the Highway Research Board in Washington, D. C., January 16-20, 1956; the 42nd Annual Road School, Purdue University, April 2-5, 1956; and the Meeting of the Department of Economics, Finance and Administration, Highway Research Board, Washington D. C., May 15-18, 1956. On campus he is a member of Civil Engineering Committee on Graduate Study, Civil Engineering Committee on Graduate Study in Transportation, Civil Engineering Committee on Undergraduate Study in Transportation, and is Secretary of Faculty, School of Civil Engineering. He is also a member of HRB Dept. of Economics, Finance and Administration; Chairman of the Committee on Highway Taxation and Finance; member of the Committee on Highway Organization and Administration; member, Committee on Roadway Pavement Markings; member, Ad Hoc Committee on State Highway Finance and Taxation Studies; and National Highway Users Conference Consultant to Committee on Highway Action. Mr. Branham is also Consultant to the County Commissioners Association of Indiana.

Donald O. Covault, Research Engineer and Instructor of Civil Engineering, prepared a paper entitled "A Study of State Highway Needs in Indiana" at the 42nd Annual Purdue Road School in April, 1955. The paper was co-authored with Mr. A. K. Branham and Prof. H. L. Michael. In addition to the meeting of the Road School, Mr. Covault attended the regular meetings of the ASCE in Indianapolis and Lafayette, Indiana and several meetings of the Indiana Society of Professional Engineers.

During the year, Mr. Covault became a member of the Indiana Society of Professional Engineers and a Junior Member of the American Society of Civil Engineers.

William Lee Dolch, Research Assistant and Instructor, published an article "Porosity and Absorption" (with D. W. Lewis), in "Significance of Tests and Properties of Concrete and Concrete Aggregates", p. 303-13, ASTM Special Technical Publication No. 169, 1956. He attended the 42nd Annual Illinois Highway Engineering Conf. at Urbana, Ill. in February, 1956. Mr. Dolch received his Ph.D. from Purdue University, January, 1956.

Robert E. Frost, Research Engineer and Associate Professor of Highway Engineering, was appointed to the Committee on Photogrammetry, American Road Builders Association. He presented a talk on Alaska before the student body at Hanover College, Madison, Indiana. He served as chairman of a subcommittee of the American Society of Photogrammetry in developing a Photo Interpretation Manual. He also served as a consultant to Snow, Ice and Permafrost Research Establishment, Corps of Engineers, and to Western Electric Corporation. Professor Frost was in charge of the Airphoto Laboratory until May, 1956, when he accepted a position as Director of the Airphoto Laboratory of the Snow, Ice, and Permafrost Establishment of the Corps of Engineers.

F. H. Green, Research Engineer and Associate Professor of Highway Engineering, presented the following papers during the past year: "Public Relations in State Highway Maintenance" at the Purdue Road School, Lafayette, April, 1956; "Highway Planning for Counties" at the Purdue Road School and the Daviess County Road School, February, 1956; and "Engineering in County Highway Operations" at the District Meeting of County Commissioners, Huntington, 1956. He published the article "Highway Engineering Training", in Proceedings, World Meeting, International Road Federation, October, 1955.

William Horner Goetz, Research Engineer and Associate Professor of Highway Engineering, presented "The Strength of Bituminous Mixtures and Their Behavior under Repeated Loads", co-authored with L. E. Wood, to the Annual Meeting of the Highway Research Board, January, 1956; "Sonic Test for the Evaluation of Stripping Resistance in Compacted Bituminous Mixtures", co-authored with O. B. Andersland, to Annual Meeting of the Association of Asphalt Paving Technologists, February, 1956; "Effect of Crushed Gravel Fine Aggregates on the Strength of Asphaltic Surfacing Mixtures", by R. P. Lottman and W. H. Goetz, to 40th Annual Convention of the National Sand and Gravel Association, February, 1956 and to the Annual Purdue Road School, April, 1956. He had published "Permeability, Void Content, and Durability of Bituminous Concrete" co-authored with J. F. McLaughlin in Proceedings, HRB; and "Sonic Testing of Bituminous Mixtures" Proceedings of the Association of Asphalt Paving Technologists.

Mr. Goetz attended the following meetings during the year: The Board of Directors of Association of Asphalt Paving Technologists, in Detroit, Mich. in September, 1955; AREA, at Chicago, Ill. in October; the Annual Meeting of the HRB, in Washington, D. C. in January 1956; in February,

the Board of Directors of the Association of Asphalt Paving Technologists, Cleveland, O., and the Annual Meetings of the Association of Asphalt Paving Technologists at Cleveland, O. and the National Sand and Gravel Association, at Chicago, Ill.; in March the Meeting of Committee 29 of AREA at Chicago, Ill.; the Annual Meeting of ISPE at Ft. Wayne in April; the Ill-Ind-Sect. of ASEE at Purdue in May, 1956; and two meetings of Ind. Sect. of ASCE and three meetings of the Lafayette Chapter of ISPE during the year.

Mr. Goetz, who was made a member of ASEE this year, is also a member of the Graduate School Committee on Foreign Students and Chairman of two, and a member of five Civil Engineering Committees on campus; Chairman of the Enforcement Committee of the Lafayette Chapter of ISPE and Member of the ISPE Enforcement Committee; Vice President of the Association of Asphalt Paving Technologists; Chairman of the Highway Research Board Committee on Surface Treatments; a member of the Highway Research Board Committee on Effect of Water on Bituminous Mixtures and Correlation of Density and Stability; and a member of ASTM Committees on Traffic Paints, Metal Protective Paints, Preparation of Panels for Testing, Emulsion Tests, Emulsified Asphalts, Bituminous Surface Treatments, Effect of Water on Compressed Bituminous Mixtures, and Physical Tests for Compressed Bituminous Mixtures.

John M. Hayes, Associate Professor of Structural Engineering, presented a paper "Effect of Initial Eccentricities on Column Performance and Capacity", a final report on Column Research Project C82 to the Column Research Council on May 24-25. He published an article on "Bridges" in the New International 1956 Year Book, Events of 1955, by Funk & Wagnalls of New York and one article of a symposium of six in Bull. No. 124, HRB, entitled "Vibration

Study of Three-Span Continuous I-Beam Bridge" by John M. Hayes & John A. Sbarounis. He attended the meetings of Committee 15 of AREA in Detroit, Mich. on July 13-14, Urbana, Ill. on Oct. 12-13, and in Chicago, Ill. on May 2-3 and Sept. 29; the Column Research Council in New York on May 24-25; the Annual Meeting of the Ill.-Ind. Section of ASEE on May 12; and on September 7-14 a Conference on Plastic Design of Steel, at Lehigh University, Bethlehem, Pa; and the Monthly Meetings of Society of Experimental Stress Analysis, American Society of Civil Engineers, and American Association of University Professors. Mr. Hayes served as Purdue's Representative to the Ill.-Ind. Section of ASEE, as a member of Committee 15--Iron and Steel Structures, AREA, and as a member of Professional Objectives Committee of the Ind. Section of ASCE.

C. W. Lovell, Jr., Research Engineer and Instructor of Highway Engineering, attended the 1956 Purdue Road School in Lafayette and the local meetings of the ASCE. He is the Civil Engineering Representative on the University Library Committee and a member of the Civil Engineering Social Committee and the Curriculum Committee subcommittees on Geology and Soil Mechanics.

J. F. McLaughlin, Research Engineer and Instructor of Highway Engineering, presented "The Effect of Crushed Stone and Heavy Media Separation on the Durability of Concrete made with Indiana Gravels" to the Highway Research Board at Washington, D. C. in January, 1956. He also presented "Durability and Deterioration of Structural Concrete" to ACI, in Philadelphia, Pennsylvania, in February 1956, and "Bridge Maintenance" to the Purdue Road School in April, 1956. Mr. McLaughlin, along with W. H. Goetz, was author of "Permeability, Void Content,

and the Durability of Bituminous Concrete" in Proceedings of HRB. He attended ASTM, Comm. C-9 in Montreal, Canada in October, 1955; Highway Research Board in Washington, D. C. in January, 1956; ACI in Philadelphia, Pa. in February, 1956; the 42nd Annual Illinois Highway Engineering Conference at Urbana, Ill. in February, 1956; Indiana Mineral Agg. Association Annual Meeting at Indianapolis, Ind. in March, 1956; the Purdue Road School in W. Lafayette, Ind. in April, 1956; and Ill.-Ind. Section of ASEE at Purdue in May, 1956. Mr. McLaughlin is a member of C-9, of ASTM and three subcommittees, IIe, IIg, and IIIo of that general committee and a member of committees B-1 & D-1 of the Highway Research Board, Department of Materials and Construction.

James H. McLerran, Research Engineer and Instructor of Civil Engineering, attended the meetings of the Indiana Mineral Aggregates Association, Indianapolis on March 16; Committee 29-Waterproofing of the American Railroad Engineering Association at Chicago on March 13; and the 42nd Annual Purdue Road School where he read the paper "Road Roughness Measurements of Indiana Pavements" for Mr. F. M. Holloway. Mr. McLerran also published a paper "Agricultural Soil Maps and Their Engineering Applications" in the Proceedings, Northwest Conference on Road Building, Oregon State College, 1955 and in the Pacific Builder and Engineer, February, 1956.

Harold Louis Michael is the Assistant Director of the Joint Highway Research Project, and an Assistant Professor of Highway Engineering. Professor Michael is a Member of the Publications Committee of the Engineering Experiment Station; Chairman of Committee No. 14, "Speed Characteristics", Department of Traffic and Operations, Highway Research Board; Vice-President of the Lafayette Section of ISPE; and was Tour Chairman of the Annual Meeting

of the Ill.-Ind. Section of ASEE. He served his community as a member of the Citizen's Traffic and Parking Committee of West Lafayette, Indiana, and as Commanding Officer of the 477th Strategic Intelligence Det.

In addition he attended 19 meetings, 9 of which were out of the state including the ARBA Committee #9 meeting in Chicago, September, 1955; the HRB Speed Characteristics Committee meeting, Committee 2-C of the ITE meeting, the HRB Dept. of Traffic and Operations meeting and the HRB meeting, where he was presiding officer of one session on January 19, all in Washington, D.C. in January, 1956; the AREA Committee #9 meeting in Chicago, March, 1956; and the HRB Traffic and Operations Dept. meeting in Chicago, June, 1956. In Indiana he attended the Montgomery Co. Industrial Management Club, October, 1955; ASCE and ISPE meetings; and the Ill.-Ind. Section ASEE meeting in May, 1956.

Professor Michael presented the paper "Development of Skid Testing in Indiana" which he co-authored with D. L. Grunau, at the Annual Meeting of the HRB in Washington in January, 1956. At the Purdue Road School, April, 1956, he presented "Progress Report on State Highway Needs", co-authored with A. K. Branham and D. O. Covault, and "Improvement Priority Ratings for Local Rural Roads in Indiana," which he edited. He published "Joint Highway Research Project at Purdue University", in Traffic Quarterly in October, 1955; "Skid Characteristics of Pavement Surfaces in Indiana," which he co-authored with D. L. Grunau and "Traffic Engineering Activities at Purdue University," in the Proceedings of the 41st Annual Purdue Road School, September, 1955; and "Rapid Transit" in the New International 1956 Year Book, Events of 1955, Funk & Wagnalls, June, 1956.

Professor Michael gave 17 talks to various educational, civic, and religious organizations throughout the state. He was Convocation Speaker at the Hanover College Student Assembly in March. "Federal Aid to Indiana highways" was his

topic of discussion at the Government Workshop at Indiana University in July. "Traffic Research Through Accident Records" was given at a Highway Seminar at Purdue; "Traffic Engineering Survey Service" and "The Police Chief and the Traffic Engineer" were given at a Police Administrators Seminar at Purdue; "The Function of the Traffic Engineer" at a Police Admininstration Course and "Skid Marks as Court Evidence" at a Traffic Court Seminar at Purdue.

Robert D. Miles, Research Engineer and Assistant Professor of Highway Engineering, was appointed to the Committee on Photogrammetry, American Road Builders Association. He attended the Annual Meeting of the Highway Research Board in January and the 9th Annual County Engineers Conference at Ames, Iowa in November. At the Conference he presented a paper on "Use of Airphotos in Highway Work." He presented talks before the Anthony Wayne Chapter of ISPE at Fort Wayne, Indiana on September 19 and November 22. He attended the Annual Purdue Road School, Professional Engineers Banquet on February 21 and was appointed to a three-year term as a member of the Purdue Military Affairs Committee. In addition, he served as a Captain of 477 SI Detachment of USAR in Lafayette, Indiana.

Merle Parvis, Research Engineer and Associate Professor of Highway Engineering, attended several meetings of the Lafayette Chapter of ISPE. He was an elected director of the chapter, and served on the membership and publicity committee.

Ben H. Petty, Professor Highway Engineering, spoke on July 18, 1955 on "Highway Improvement" at Lion's Club Dinner at Clermont, Ind.; on Aug. 15 presented a paper of "Road Schools and Short Courses" at ARBA National Highway

Conference at Gatlinburg, Tenn.; in September was speaker on "Proposals for Greatly Expanded Highway Improvement Program", to the Lafayette Kiwanis Club; on Feb. 27, 1956 presented a paper on "Importance of Highways in our Daily Living", Georgia Highway Conference, Georgia Institute of Technology in Atlanta, Ga. He gave talks on the "Importance of Highways" at the ARBA National Highway Conference at Gatlinburg, Tenn. and at the Georgia Highway Conference at the Georgia Institute of Technology at Atlanta, Ga. The Proceedings of the 41st Annual Road School at Purdue, Engineering Bulletin 39, September, 1955; "1956 Directory of Indiana State, County and City Officials" published by Purdue, February, 1956; and Highway Extension News were edited by Prof. Petty.

Prof. Petty attended 13 out-of-town meetings and several University and civic meetings during the year, serving as Toastmaster or Speaker on many of these occasions. He is a member of the Advisory Board of Joint Highway Research Project; a member of the Subcommittee in CE on Transportation Curricula; a member of the Board of Directors, ARBA; a member of the Board of Directors, Educational Division of ARBA; of "Committee 4-Transportation" in CE Division of ASEE; and Director of Indiana Highways for Survival. Prof. John Stoner, Indiana Univ. and Mr. Petty were selected by the Indiana Commission on State Tax and Financing Policy to prepare a report on "Indiana County Highway Administration."

Leonard E. Wood, Research Engineer and Instructor of Civil Engineering, became an associate Member of the Highway Research Board and a Full Member of Sigma Xi. He attended the Association of Asphalt Technologists' meeting in Cleveland in February; the Indiana Mineral Aggregates meeting in Indianapolis in March; and the Highway Research Board meeting in Washington, D. C. in January, 1956 where he presented the paper, "The Strength of Bituminous Mixtures and Their Behavior Under Repeated Loads." In addition, Mr. Wood was a

member of the committee on the evaluation of Engineering Materials course work for Civil Engineering students.

K. B. Woods, Head of the School of Civil Engineering and Director of the Joint Highway Research Project, became a Member of Tau Beta Pi; Chairman of the Highway Research Board, National Research Council; and First Vice President of ASTM. He is Chairman of the Special Committee at Purdue on Development of Research in the field of Crash Safety; Supervisor of Development of Airphoto Mosaics of State Institutions for the Indiana Budget Committee; and a member of the Administrative Committee to develop research programs at the Calumet Center on a University level, a member of the Indiana Flood Control and Water Resources Commission and member of several dozen technical committees of ACI, ASTM, HRB, ASCE, and others on a national and state level. He is also Consultant to the Corps of Engineers, U. S. Army--working with the airfield branch including research in Greenland.

Among the papers he presented are "Explorations", MIT, Cambridge on July 3-7; University of California talk on "Integrating Highway Engineering in Civil Engineering Curriculum", July 22-29; St.Louis Section of ASCE, talk on "Recent Developments in Highways", November 21; "Trends in Transportation", Ag. Econ. Group, February 3; Talk to County Commissioners--"How Can Purdue Aid County Commissioners?", April 4. He is also author of "Roads and Streets" in the New International Year Book, Events of 1955, 1956 and "Roads and Streets", Encyclopedia Britannica, 1956.

Prof. Woods also attended 46 out-of-town meetings and many University and Board meetings during the year.

Pai Tao Yeh, Research Engineer and Instructor in Highway Engineering, attained membership in the Society of American Military Engineers. He attended

several meetings of the Lafayette Chapter, Indiana Society of Professional Engineers. He attended the 42nd Annual Purdue Road School, the 3rd Graphic Conference at Purdue University, and the 19th Ill.- Ind. Section of ASEE Conference.

E. J. Yoder, Research Engineer and Associate Professor of Highway Engineering attended the Highway Research Board meeting in Washington, D. C. in January, 1956, and presented a paper with Mr. J. S. Bell at the Purdue Road School in Lafayette in April, 1956. The paper was entitled "Plastic Water Barriers for Highways and Airports." Prof. Yoder served on the Curriculum subcommittees on Transportation, Materials, and Soil Mechanics.

PUBLICATIONS

Papers, Bulletins, Reprints, and Theses

July 1, 1955 to June 30, 1956

Annual Reports - Engineering Experiment Station*

EES Bull.	Vol.	No.	Date	Publications (inclusive)	Period Covered
83	25	5	Sept. 1941	1P - 45P	Jan. 1936 - June 1941
85	26	4	July 1942	46P - 60P	July 1941 - June 1942
91	27	6	Nov. 1943	61P - 73P	July 1942 - June 1943
94	29	1	Jan. 1945	74P - 91P	July 1943 - June 1944
96	29	4	July 1945	92P - 103P	July 1944 - June 1945
100*	31	1	Jan. 1945	104P - 124P	July 1945 - June 1946
102	31	5	Sept. 1947	119P - 157P	July 1946 - June 1947
107	33	1	Jan. 1949	158P - 176P	July 1947 - June 1948
110	34	2	Mar. 1950	177P - 212P	July 1948 - June 1949
113	35	4	July 1951	213P - 243P	July 1949 - June 1950
116	36	3	May 1952	244P - 272P	July 1950 - June 1951
119	37	3	May 1953	273P - 307P	July 1951 - June 1952
120	37	6	Nov. 1953	308P - 345P	July 1952 - June 1953
122	38	6	Nov. 1954	346P - 374P	July 1953 - June 1954
126	39	6	Nov. 1955	375P - 400P	July 1954 - June 1955

* Also see EES Bulletin No. 99 which covers a complete listing of publications 1-122P.

Reprints

401P "Skid Characteristics of Pavement Surfaces in Indiana," by D. L. Gruney and H. L. Michael, Proceedings of the 41st Annual Purdue Road School, Extension Series No. 88, Vol. 39, No. 5, pp. 73-96, September 1955 (Engineering Reprint of the Joint Highway Research Project No. 107).

402P "Deterioration of Structural Concrete in Indiana," by D. W. Lewis, Proceedings of the 41st Annual Purdue Road School, Extension Series No. 88, Vol. 39, No. 5, pp. 97-114, September 1955 (Engineering Reprint of the Joint Highway Research Project No. 108).

403P "The Permanence of Limited Access Highways," by Adolf D. May, Jr., Proceedings of the 41st Annual Purdue Road School, Extension Series No. 88, Vol. 39, No. 5, pp. 115-130, September 1955 (Engineering Reprint of the Joint Highway Research Project No. 109).

404P "Traffic Engineering Activities at Purdue University," by H. L. Michael, Proceedings of the 41st Annual Purdue Road School, Extension Series No. 88, Vol. 39, No. 5, pp. 175-186, September 1955 (Engineering Reprint of the Joint Highway Research Project No. 110).

405P "Continuous Reinforcement in Concrete Pavements," by Harry D. Cashell and Wilmer E. Teske, Proceedings of the Thirty-Fourth Meeting of the Highway Research Board, Vol. 34, pp. 34-56, 1955 (Engineering Reprint of the Joint Highway Research Project No. 112).

406P "Permeability, Void Content, and Durability of Bituminous Concrete," by J. F. McLaughlin and W. H. Goetz, Proceedings of the Thirty-Fourth Annual Meeting of the Highway Research Board, Vol. 34, pp. 274-286, 1955 (Engineering Reprint of the Joint Highway Research Project No. 111).

407P "Application of Statistical Methods to Laboratory Freeze-Thaw Test Data," by P. E. Irick and J. B. Blackburn, Proceedings of the Thirty-Fourth Annual Meeting of the Highway Research Board, Vol. 34, pp. 329-367, 1955 (Engineering Reprint of the Joint Highway Research Project No. 113).

408P "Sonic Testing of Bituminous Mixtures," by W. H. Goetz, Proceedings of the Association of Asphalt Paving Technologists, Vol. 24, 1955 (Civil Engineering Reprint No. 114)

Theses

409P "A Study of Variability in Concrete Freeze-Thaw Test Data," A thesis submitted to the faculty of Purdue University by J. B. Blackburn, in partial fulfillment of the requirements for the degree of Doctor of Philosophy, July, 1955.

410P "Lateral Placement of Vehicles Under Specified Conditions," A thesis submitted to the faculty of Purdue University by David Rosenfield, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, September, 1955.

411P "Rural Highway Classification and Evaluation Procedures for Indiana Counties," A thesis submitted to the faculty of Purdue University by J. E. Baerwald, in partial fulfillment of the requirements for the degree of Doctor of Philosophy, September, 1955.

412P "Airphoto Study and Mapping of Southcentral Indiana Sandstone-Shale-Limestone-Soil Materials," A thesis submitted to the faculty of Purdue University by L. C. Stylianopoulos, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, December, 1955.

413P "The Use of Urban Characteristics in Estimating Internal Travel Patterns," A thesis submitted to the faculty of Purdue University by J. W. Barr, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, February, 1956.

414P "Effect of Crushed-Gravel Fine Aggregate on the Strength of Bituminous Surface Mixtures," A thesis submitted to the faculty of Purdue University by R. P. Lottman, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, February, 1956.

415P "Sonic Test for Evaluation of Stripping Resistance in Compacted Bituminous Mixtures," A thesis submitted to the faculty of Purdue University by O. B. Anderoland, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, February, 1956.

416P "Driver Obedience to Stop and Slow Signs," A thesis submitted to the faculty of Purdue University by W. T. Jackman, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, March, 1956.

417P "Permeability and Absorptivity of Indiana Limestone Coarse Aggregates," A thesis submitted to the faculty of Purdue University by W. L. Dolch, in partial fulfillment of the requirements for the degree of Doctor of Philosophy, March, 1956.

418P "Road Roughness Measurements on Indiana Pavements," A thesis submitted to the faculty of Purdue University by F. M. Holloway, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, June, 1956.

419P "Engineering Interpretation of Agricultural Soil Maps and Correlation with Airphoto Patterns," A thesis submitted to the faculty of Purdue University by D. D. McGregor, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering, June, 1956.

(See also list of Appendix)

420P "Indiana Geology as it Influences Engineering Projects", by James G. Johnstone, Proceedings, 41st Annual Road School, Extension Series No. 88, Vol. 39, No. 5, Purdue University, September 1955, pp. 161-174.

421P "Using Drainage Information obtained From Aerial Photographs" by Merle Purvis, Proceedings, 41st Annual Road School, Extension Series No. 88, Vol. 39, No. 5, Purdue University, September 1955, pp. 187-227.

422P "Classification and Evaluation of Indiana County Roads", by John E. Baerwald, Proceedings, 41st Annual Road School, Extension Series No. 88, Vol. 39, No. 5, Purdue University, September 1955, pp. 228-238.

423P "Plate-Bearing Tests for Design of Flexible and Rigid Pavements", by E. J. Yoder, Proceedings, 41st Annual Road School, Extension Series No. 88, Vol. 39, No. 5, Purdue University, September 1955, pp. 239-259.

424P "Economics of Operation on Limited-Access Highways", by A. D. May, Jr., Highway Research Board Bulletin No. 107, Vehicle Operation as Affected by Traffic Control and Highway Type, National Academy of Sciences, National Research Council pub., No. 358, January 1955, pp. 49-62.

425P "Establishing a Priority for Local Rural Road Improvements", by John E. Baerwald, Traffic Quarterly, April 1956, pp. 223-246.

426P "Effect of Crushed Gravel Fine Aggregate on the Strength of Asphaltic Surfacing Mixtures", by R. P. Lottman and W. H. Goetz, National Sand and Gravel Association Circular No. 63, March 1956, 22 pp.

427P "Porosity and Absorption", by W. L. Dolch, Significance of Tests and Properties of Concrete and Concrete Aggregates, pp. 303-313, ASTM Special Technical Publication No. 169, 1956.

428P "County Road Identification and Numbering of Rural Residences", by A. K. Branham, Public Works Magazine, Vol. 87, No. 6, June 1956, pp. 105-110.

429P "The Use of Aerial Photographs in Highway Work", by R. D. Miles, Proceedings, Ninth Annual County Engineers Conference, Iowa State College, Ames, Iowa, November 29-December 1, 1955.

430P "Roads and Streets", by K. B. Woods and A. K. Branham, The New International 1956 Year Book - Events of 1955, Funk and Wagnalls Company, New York, New York, June 1956.

431P "Roads and Streets", by K. B. Woods, Encyclopaedia Britannica, 1956.

432P "Joint Highway Research Project at Purdue University", by Harold L. Michael, Traffic Quarterly, October 1955, pp. 563-577.

433P "Rapid Transit", by Harold L. Michael, The New International 1956 Year Book - Events of 1955, Funk and Wagnalls Company, New York, New York, June 1956.

434P "Bridges", by John M. Hayes, The New International 1956 Year Book - Events of 1955, Funk and Wagnalls Company, June 1956.

435P "Vibration Study of Three-Span Continuous I-Beam Bridge", by John M. Hayes, Highway Research Board, Bulletin No. 124, Vibration and Stresses in Girder Bridges, 1956, pp. 47-78.

436P "Current Characteristics of Rural Motor-Vehicle Speeds (Indiana)", Proceedings, Highway Research Board, 34th Annual Meeting, 1955, pp. 473-482.

437P "Roads to Ruin", by Ben H. Petty, Construction Digest, Vol. 28, No. 15, pp. 42 and 129.

438P "Need for Engineers on Local Roads", by Ben H. Petty, Better Roads, Guest Editorial, Vol. 25, No. 8, pp. 3-4, August 1955.

439P "How Important Is It", by Ben H. Petty, Rural Roads, Guest Editorial, Vol. 5, No. 4, p. 32, July-August 1955.

440P "First Things First", by Ben H. Petty, Virginia Highway Bulletin, Vol. 22, No. 2, pp. 6-7, February 1956.

441P "How Would You Finance Our Needed Highways", by Ben H. Petty, Engineering News Record, Vol. 155, No. 26, pp. 49-50, December 1955.

442P "Teaching - The Professor of Civil Engineering", by Ben H. Petty, Public Works, Vol. 87, No. 5, pp. 137-138, May 1956.

Note 1. In addition, "Proceedings of the 41st Annual Purdue Road School", Extension Series No. 88, Vol. 39, No. 5, September 1955, 301 pp.; 1956 Directory, Indiana State, County, and City Highway Officials", 27 pp.; and "Highway Extension News" monthly, 12 issues, 2 pp. each were edited by B. H. Petty and published by the Joint Highway Research Project.

Note 2. Summaries of the various researches and a listing of the publications that have been published by the Engineering Experiment Station Annual Reports previously listed.

JOINT HIGHWAY RESEARCH PROJECTS AND ADVISORY BOARD REPORTS
July 1, 1955 to June 30, 1956

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
780-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 21.	A	Goldmacher	6/25	1	0	112	XVII	3	A	2
781-Road Roughness Survey of Three Road Sections in the State of Indiana.	53I	Holloway	7/13	14	0	112	XVII	3	A	3
782-Progress Report No. 2 on a Study of State Highway Needs in Indiana.	54T	Michael Branham Baerwald	7/13	8	1	112	XVII	3	A	16
783-A Study of Variability in Concrete Freeze-Thaw Test Data.	37S	Blackburn	7/13	117	4	112	XVII	3	A	24
784-Proposed Working Plan - The Use of Urban Characteristics in Estimating Internal Travel Patterns.	54V	Barr	7/13	11	0	112	XVII	3	A	141
785-Parking Salesmanship--Will the Public Buy Your Program?		Michael	7/13	8	0	112	XVII	3	A	152
786- Annual Report of Assistant Director, 1954-1955.		Michael	7/1	68	0	112	XVII	3	A	163
787-Progress Reports on a Study of the Relative Support Characteristics of Nine Subgrade Treatments.	A	Goldmacher Michael	9/21	6	0	112	XVII	3	A	237
788-Lateral Placement of Vehicles Under Specified Conditions.	17L 53F	Rosenfield	9/21	110	21	112	XVII	3	A	243

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
789-Progress Report No. 1 - The Road Roughness Study of Indiana Pavements.	53I	Holloway	9/21	18	1	112	XVII	3	A	353
790-Traffic Speed Report No. 57 -- Truck Weight - Speed Study.	10	Holloway	9/21	19	8	112	XVII	3	A	371
791-Progress Report No. 3 on Skid Resistance Study of U.S. 31 Test Road.	53E	Barr	9/21	16	3	112	XVII	3	A	390
792-Sonic Testing of Bituminous Mixtures.		Goetz	9/21	29	13	112	XVII	3	A	406
793-Results of Density Measurements on Bituminous Concrete Experimental Section - S.R. 37.	31E	McLaughlin Goetz	9/21	20	1	112	XVII	3	A	440
794-Progress Report No. 1 - The Use of Aluminum Foil in Durability Testing of Concrete.	37S	McLaughlin	9/21	5	0	112	XVII	3	A	460
795-Rural Highway Classification and Evaluation Procedures for Indiana Counties.	54P	Baerwald	9/21	136	5	113	XVII	3	B	?
796-A Study of Local Rural Highways in Allen County, Indiana.	54R	Baerwald	9/21	141	7	113	XVII	3	B	139
797-Proposed Working Plan for the Compilation of an Atlas of Indiana's County Drainage Maps.	51A	Parvis	9/21	6	0	113	XVII	3	B	279
798-Airphoto Interpretation of Drainage Features of Warren County, Indiana.	51A	Parvis	9/21	14	1	113	XVII	3	B	285
799-Test Data Taken for Test Road Using D.D.A.C.		Yoder	10/18	11	9	114	XVII	4	A	2

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
800-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 24.	A	Goldmacher	9/27	1	0	114	XVII	4	A	13
801-Airphoto Interpretation of Drainage Features of Huntington County, Indiana.	51A	Parvis	10/18	17	1	114	XVII	4	A	14
802-A Study of the Effects of Pedestrian Interval Signals on Travel Times.		Barr	10/18	27	4	114	XVII	4	A	31
803-Traffic Speed Report No. 56.	10	Jackman	10/18	16	5	114	XVII	4	A	58
804-Proceedings - Third Annual Traffic Control Conference.		Baerwald Jackman	10/18	110	6	114	XVII	4	A	74
805-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 25.	A	Goldmacher	10/25	1	0	114	XVII	4	A	192
806-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 26.	A	Goldmacher	11/28	2	0	114	XVII	4	A	193
807-Airphoto Interpretation of Soils of Monroe County, Indiana.	51B	Yoh	12/13	32	10	114	XVII	4	A	195
808-Airphoto Study and Mapping of South-central Indiana Sandstone-Shale-Limestone-Soil Materials.	51F	Stylianopoulos	12/13	147	59	114	XVII	4	A	227
809-Synopses of Highway Research Board Papers.		Walker-McLaughlin, Michael-Grunau, Goetz-Wood, Baerwald	12/13	9	0	114	XVII	4	A	374

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
810-Proposed Working Plan for Investigation of Stresses and Deflections in Plain and Reinforced Concrete Pavements.	46M	Miller	2/1	6	0	115	XVIII	1	A	2
811-Airphoto Interpretation of Drainage Features of Wabash County, Indiana (1956 No. 1).	51A	Parvis	2/1	14	1	115	XVIII	1	A	8
812-The Use of Urban Characteristics in Estimating Internal Travel Patterns (1956 No. 2).	54V	Barr	2/1	131	25	115	XVIII	1	A	22
813-Progress Report No. 1 - Performance of Rigid Pavements Constructed on Granular Bases (1956 No. 3).	45F	Yoder	2/1	39	21	115	XVIII	1	A	153
814-Progress Report No. 3 - A Study of State Highway Needs in Indiana (1956 No. 4).	54T	Michael Covault	2/1	62	6	115	XVIII	1	A	192
815-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 27.	A	Goldmacher	12/27	1	0	115	XVIII	1	A	254
816-Progress Report No. 1 - Subgrade Support Characteristics - Experimental and Theoretical (1956 No. 5).	A	Goldmacher Anderson Partridge Wood, Dunkin	2/1	72	53	115	XVIII	1	A	255
817-Proposal for Extension of Project C-36A (Purdue) HPS 1-(13) (SHDI & BPR)	A	Michael	2/1	12	0	115	XVIII	1	A	327

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
818-Effect of Crushed-Gravel Fine Aggregate on the Strength of Bituminous Surface Mixtures (1956 No. 6).		Lottman	2/1	11[illegible]	24	116	XVIII	1	B	1
819-Sonic Test for Evaluation of Stripping Resistance in Compacted Bituminous Mixtures (1956 No. 7).	8C	Anderoland	2/1	111	27	116	XVIII	1	B	116
820-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 29.	A	Goldmacher	2/27	1	0	116	XVIII	1	B	235
821-Driver Obedience to Stop and Slow Signs (1956 No. 8).	170	Jackman	3/13	60	20	116	XVIII	1	B	236
822-Permeability and Absorptivity of Indiana Limestone Coarse Aggregates (1956 No. 9).	47F	Dolch	3/13	167	21	116	XVIII	1	B	296
823-Progress Report No. 3 on Freezing and Thawing of Concrete in the Automatic Freezer (1956 No. 10).	37S	McLaughlin	3/13	36	27	117	XVIII	1	C	1
824-Proposal for Research on Creep and Shrinkage Strains in Prestressed Concrete Using Two Typical Indiana Aggregates.	58A	Midgaard	3/13	7	0	117	XVIII	1	C	37
825-Proposed Working Plan for Engineering Interpretation of Agricultural Soil Maps and Correlation with Airphoto Patterns.	51I	McGregor	3/13	8	0	117	XVIII	1	C	44

Report and No.	Proj. C-36	Author	Date	Pages	Figs	Bk.	Vol.	No.	Pt.	Pg.
826-Sonic Test for Evaluation of Stripping Resistance in Compacted Bituminous Mixtures (1956 No. 11).	8C	Andersland Goetz	3/13	49	11	117	XVIII	1	C	52
827-Road School Papers		Staff	3/13	9	0	117	XVIII	1	C	101
828-Effect of Crushed-Gravel Fine Aggregate on the Strength of Asphaltic Surfacing Mixtures (1956 No. 12).		Lottman Goetz	3/13	55	14	117	XVIII	1	C	114
829-Development of Skid Testing in Indiana (1956 No. 13).	52G	Michael Grunau	3/13	33	4	117	XVIII	1	C	165
830-The Effect of Crushed Stone and Heavy Media Separation on the Durability of Concrete Made with Indiana Gravels (1956 No. 14).	37T	Walker McLaughlin	3/13	36	6	117	XVIII	1	C	198
831-The Strength of Bituminous Mixtures and Their Behavior Under Repeated Loads (1956 No. 15).	6J	Wood Goetz	3/13	39	14	117	XVIII	1	C	234
832-Progress Report No. 4 - A Study of State Highway Needs in Indiana (1956 No. 22).	54T	Branham Covault Michael	4/19	44	24	118	XVIII	2	A	3
833-Progress Report No. 2 on the Skid Resistance Study of Experimental Federal-Aid Project F-147(6) (1956 No. 17).	53H	Holloway	4/19	9	0	118	XVIII	2	A	47
834-Traffic Speed Report No. 58 (1956 No. 18).	10	Holloway	4/19	13	0	118	XVIII	2	A	56

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
835-Progress Report No. 4 on the Skid Resistance Study of U.S. 31 Test Road (1956 No. 19).	53E	Holloway	4/19	16	3	118	XVIII	2	A	69
836-Road Roughness Measurements on Indiana Pavements (1956 No. 20).	53I	Holloway	4/19	33	7	118	XVIII	2	A	85
837-Improvement Priority Ratings for Local Rural Roads in Indiana (1956 No. 21).	54P	Michael	4/19	18	0	118	XVIII	2	A	118
838-Plastic Moisture Barriers for Highway Subgrade Protection (1956 No. 23).		Bell Yoder	4/19	25	6	118	XVIII	2	A	136
839-Airphoto Interpretation of Drainage Features of Whitley County, Indiana (1956 No. 16).	51A	Parvis	4/19	10	1	118	XVIII	2	A	161
840-Proposed Working Plan for Bridge Site Topographic Maps.	32L	Miles	4/19	6	0	118	XVIII	2	A	171
841-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 30.	A	Goldmacher	3/26	1	0	118	XVIII	2	A	177
842-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 31.	A	Goldmacher	4/26	1	0	118	XVIII	2	A	185
843-A Study of the Relative Support Characteristics of Nine Subgrade Treatments. Report No. 32.	A	Goldmacher	5/26	1	0	118	XVIII	2	A	186

Report and No.	Proj. C-36	Author	Date	Pages	Figs.	Bk.	Vol.	No.	Pt.	Pg.
844-Proposed Plan of Study - Triaxial Testing of Bituminous Mixtures at High Confining Pressures.	6K	Oppenlander	6/11	9	0	118	XVIII	2	A	187
845-Road Roughness Measurements on Indiana Pavements (1956 No. 24).	53I	Holloway	6/11	99	25	118	XVIII	2	A	196
846-Engineering Interpretation of Agricultural Soil Maps and Correlation with Airphoto Patterns (1956 No. 25).	51I	McGregor	6/11	107	21	118	XVIII	2	A	295

SUMMARY TABULATION OF RESEARCH PROJECTS WITH REPORT AND PUBLICATION NUMBERS

July 1, 1955 - June 30, 1956

KEY TO STATUS NUMBERS

Key Number

1 Complete--unpublished.
2 Complete-published (including completed theses).
3 Incomplete--inactive.
4 Complete--publication in progress.
5 Active--incomplete.
6 Being started.
7 Planned.

* Resigned

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
& 2	6-2-4-2	Jackson*	2	Test Road No. 1		
3	6-2-4-3	Jackson*	2	Test Road 2--Stab.		
4	2-5-3	Shelburne*	2	Surface Treatment		
5	6-2-4			Soils--Lab. Studies		
	6-2-4-7	Graves*	1	A--Durability		
	6-2-4-5	Winn*	2	B--Frost Action		
	6-2-4-8	Kay*	2	C--Permeability		
	6-2-4-6	Mayo*	2	D--Compression		
	10-0-10	Frost*	1	E--Frost Heave Tr.		
6	2-5-5			Bituminous Mixtures		
	2-5-5-1	Graves*	3	A--Curing & Temp.		
	2-5-5-2	Graves*	1	B--Patching Proced.		
	2-5-5-3	Graves*	3	C--Strength vs. Grad.		
	2-5-5-4	Layman*	2	D--Weathering		
	2-5-5-5	Chen*	2	E--Stability		
	2-5-5-6	McLaughlin	5	F--Resurface Mix.		406P
	2-5-5-7	Herrin* & Goetz	2	G--Particle Shape		
	10-62	Havers* & Dusenbury*	2	H--Rubber Asphalt		
	2-5-5-9	Osili*	2	I--Seal Coats		
	2-5-5-10	Wood	5	J--Str. & Deform. Charac.	831	
	2-5-5-11	Oppenlander	5	K--Triaxial Testing at High Pressure	844	
	2-5-4	Tyler*	2	Rock Asphalt		
		Goetz	1	A--Resurvey		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
8	2-5-1			Bituminous Adhesion		
		Goetz	2	A--Untreated		
		Tyler*	3	B--Admixtures		
	2-5-1-1	Andersland	2	C--Sonic Testing	819, 826	415P
9	1-5-1	Shelburne*	2	Aggregate Degradation		
10	8-1			Traffic Speeds		
		Lawshe*	2	A--Bibliography		
		Branham	2	B--Equipment		
		Various	5	C--Results	790, 803, 834	436P
11	8-9			Weather Station		
			1	A--Pvt. Pumping Data		
12	2-5-2	Shelburne*	2	Test Road No. 3		
	2-5-2-1	Goetz	2	A--Resurvey		
	2-5-2-1	Chang*	2	B--Sample Tests		
13	6-2-4-4	Belcher*	2	Test Rd. Sur. Treat.		
14	6-2-5-2	Gregg*	2	Triaxial Tests		
	6-2-5-6	Zegarra*	2	A--Soil Bit. Mix		
	10-26-1	Goetz	2	B--Tri. & Marshall		
	6-2-5-7	McLaughlin	2	C--Strength Tests		
15	6-2-5-1			Drainage		
		McAlpin*	2	A--Small Models		
		McClelland*	2	B--Large Models		
	6-2-5-5	Lu*	2	C--Capillarity		
		Hittle*	3	D--Capillary Potent		
	6-2-4-10	Robertson*	2	E--Permeability		
			3	F--Drains--Agg. Grad.		
	8-7	Slessor*	1	G-Soil-Vapor Press		
	7-3-1	Yeh	2	H-Hydrology		
	6-7	Kashef*	2	I--Numerical Solution to Flow Problems		
16	8-4-2	Belcher*	2	Field Soil Temp.		
		Yoder & Lowrie*	2	A--General		
	8-4-3-2	Lennertz* & Lovell	5	B--Soil Temp. Gages		
	8-4-3-3	Lovell	5	C-Soil Mois. Meas. Dev.		
	8-4-3-4	Lovell	1	D--Freezing Index Maps		
17	8-1-2			Traffic Research		
	8-1-2-1	Green	3	A--Signs		
	8-1-2-2	Wilson*	2	B-Intersections		
	8-1-2-3	Green	3	C-Pvt. Usage		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
	8-1-2-4	O'Mara*	2	D--Accidents		
	8-1-2-5	Quimby*	2	E--Bridges		
	8-1-2-6	Overmyer*	2	F--Width		
	8-1-2-7	Baerwald*	2	G--Psychology		
	8-1-2-10	Lang*	2	H--Shoulders		
	8-1-2-11	Barkley*	2	I--Bibliography		
	8-1-2-12	Green, Michael	5	J--Needs in Cities		
	8-1-2-13	Green	3	K-St. Hwy. Hazards		
	8-1-2-14	Rosenfield*	2	L--Lateral Placement of Vehicles	788	410P
	10-4-8-11-2	Baerwald*, Berry, Green	5	M--Short Crse. on Hwy Traf. Conf.	804	
	10-2-1-2	Green, Michael Branham, Berry	5	N--Traffic Extension		
	8-1-2-1-1	Jackman*	2	O--Driver Characteristics affecting signs.	821	416P
	8-12-16	Barr*	1	P--Scramble System	802	
18	1-5-2	Sweet*	2	Chert in Aggregate		
19	5-3-1			Concrete-General		
	5-3-1-1	Jones*	2	A--Phys. Tests		
	5-3-1-2	Robertson*	1	B--Cores, U.S. No.40		
	5-3-1-3	Jones*	1	C--Fatigue		
	5-3-1-4	Shelburne*	1	D--Scaling, R. 20		
20				Salt Migration		
	7-1	Slesser*	2	A--Laboratory		
	7-1-1	Frost*	1	B--Route 30 Heave		
21	2-5-8			Local Aggregates		
	2-5-8-1	Metcalf*	2	A--Sandstone		
	2-5-8-2	Rice*	2	B--Sand		
22	2-5-7	Tyler*	2	Bituminous Emulsions		
23	5-8			Concrete Scaling		
		Green	3	A--Linseed Oil		
		Green	3	B--Field Studies		
24	2-5-6	Bonewitz*	2	Asphalt Structures		
25	8-11	Lewis		Dynamic Modulus		
	8-11-1	Bawa*	2	A--Bit.-Agg. Mix.		
		Whitehurst*	2	B--Time of Set		
	8-11-2	Yong*	2	C--Sonic vs. Mech. Test of Bitum. Mix.	792	408P

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
26	7-4			Paints		
	7-4-1	Goetz	2	A--Traffic Paints		
	7-4-2	Goetz	1	B--Blackouts		
	7-4-3	Goetz	5	C--Laboratory & Field		
	7-4-4	Goetz	7	D--Bridge Paint		
	10-63	Blackburn*	2	E--Waterproofing		
	7-4-6	Goetz	5	F--Prison Paints		
27	6-2-4-9	Shelburne*	1	Test Road No. 4		
28	6-2-1-1			Photoelasticity		
		Woodsmall*	2	A--Subg. Stress		
		Baker*	2	B--Calculations		
		Hittle*	1	C--Dowel Bars		
		Hittle*	1	D--Conc. Arch		
29	8-4-6	Hittle*	2	Aerial Strip Maps		
	8-10	Metteg*	3	A--Highway Locations		
30	15-5			Glacial Geology		
	8-4-1	Woods, Yoder & Johnstone*	1	A--Preglacial Marietta River paper.		420P
31	2-6			Bitum. & Con. Perf.		
	2-6-1	Shelburne*	1	A--Route 26		
	2-6-2			B--Rd. Roughness (see C-36-53)		
	2-6-3			C--		
	2-6-4	Shelburne*	1	D--Spring Breakup '43		
	2-6-5	Goetz & McLaughlin	5	E--Bit. Conc. Resurfacing793		
	6-2-1-2	Shelburne*	1	F--S.R. 17		
32	8-4-5			Aerial Photography		429P
	8-4-5-1	Belcher*	2	A--Gran. Mat. & Tech.		
	8-4-5-6	Frost*	3	B--Indiana Manual		
	8-4-5-10	Miles	2	C--Strip Maps		
	8-4-5-7	Montano*	3	G--Indiana Manual		
	8-4-5-8	Frost*	1	H--U.S. 40-T.H.		
	8-4-5-9	Mollard*	1	I--Valpo. Moraine		
	8-4-5-13	Nishimura*	2	J--Erie Moraines		
	8-4-5-12	Howe*	2	K--Ground Water		
	8-4-5-14-1	Miles	6	L--Photogrammatric Mapping	840	
33	6-2-4-11	McAlpin* Belcher*	1	Test Road No. 5		
34	6-2-4-12	Belcher*	1	Test Road No. 6		
35	5-3-2			Conc. Performance		
	5-3-2-1	Shelburne*	1	A--Route 67		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
	5-3-2-2	Tung*	1	B--Route 29		
		Shelburne*	1	C--Route 6		
		Shelburne*	1	D--Route 30		
		Shelburne*	1	E--Roughness		
		Camp*	1	F--U.S. No. 50		
36				Indiana Soil Problems		
	8-2		1	A--Equipment		
	6-2-3-1	Lennertz*	2	B--Geophysical		
	10-9-7-7	Larew*	2	C--Landslides		
	10-12-4	Woods	2	D--Soil Surveys		
	6-2-3-2	Shurig	5	E--Subsurface Exploration		
	6-2-3-3	Moore*	2	F--Airphotos		
37	5-5			Conc. Durability		
	5-5-1	Shelburne*	3	A--Curing		
	5-5-2	Sweet*, Woods	2	B--Base Courses		
	5-5-3	Soon*	3	C--Coarse Aggregate		
	5-5-4	Lewis*	3	D--Sonic-Lab.		
	5-5-5	Lewis*	3	E--Sonic Field		
	5-5-6	Glover*	3	F--Coef. Expansion		
	5-5-7	Bugg*	2	G--Air Entrn-Aggr.		
	5-5-7	Blackburn*	2	H--Air Entrn-Aggr.		
	5-5-8	Pendley*	2	I--Restr.-Dur.Char.		
	5-5-9	Lu*	2	J--Therm. & Mois. Exp.		
	5-5-10	Fears*	2	K--Pore Charac.		
	5-5-12	Higg*, McLaughlin	5	L--Concr. Durab.	794,823	
	5-5-11	Blackburn*	2	M--Agg. Dur. in Air-Entr. Conc.		
	5-5-13	Barkley*	3	N--Concr. Admix.		
	5-5	Sweet*	2	O--Phys. Prop.		
	5-5-14-1	Venters*, Lewis* McLaughlin	5	P--Gravel		
	5-5-15	Batchelder*	2	Q--Air Content on Conc.		
	5-5-16	Lewis*, Whitehurst* McLaughlin	2	R--Bridge Concrete		402P
	5-5-11-1	Lewis* Irick*		S--Crushed Stone Test	783	407P
		Blackburn*	2	Variability		409P
	5-5-14-2	Walker*	2	T--Gravel-Stone-Fly Ash Mixt.	830	
	5-5-20	McLaughlin	5	U--HRB Cooperative Study		
	5-5-19	McLaughlin	6	V--Dur. Pre-Stressed Conc.		
	5-5-18	Nordby, McLaughlin	5	W--Air-Entr. Conc. Pave.		
38	6-2-1-4			Soil Mapping		
			2	A--Field and Lab.		
			1	B--Route 20		
	6-2-1-5		1	C--U.S. No. 31		
39	8-8	Woods	3	Truck Loads		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
40	6-2-4-13	Belcher*	1	Tr. No. 7--Soil--C		
	6-2-4-14	Goetz	1	A--Perf. S.R. 267		
41	7-6			Plastics		
	7-6-1	Yohalem*	2	A--Durability		
	7-6-2	Lewis*	2	B--Strength		
	7-6-3	Slate*	3	C--New Plastic & Signs		
	7-6-4	Slate*	2	D--Centerline Mark		
42	1-5-3	Lewis		Aggregate Survey		
	1-6-1	Sweet*	2	A--Phy. & Chem. Tests		
	1-6-2	Woods	2	B--Origin & Destr.		
	1-6-3	Fears*	2	C--Biblio. Aggreg.		
	1-8	Lewis* McLaughlin	5	D--Specifications		
43	6-3			Pedological Soils - Lab.		
			3	A--St. Dens. Proctor		
		Hittle*	3	B--Typ. Proctor Curves		
44				Concrete Pumping		
	5-4	Green	2	A--Field Surveys		
	5-4-1	Shelburne*	2	B-Pvt. Jack		
	5-4-2	Green				
	5-4-3	Goetz, Green	2	C--Pumping Mixes		
	10-9-2-3	Lovell	2	D--Underscaling & Crack Fill		
	2-5-11	Goetz	3	D--Rig. Pvt. Salvage		
	5-4-1-3	Lewis*	2	E--1951 Survey		
	5-4-1-4	Staff	2	F--Rigid Pavement in Ind.		
45	6-4			Base Courses		
	6-4-1	Yoder	2	A--Gran. Bases-Lab.		
	6-4-2	Henderson*	2	B--U.S. 30 Bases		
	6-4-3	Soon*	1	C--Temp.vs. Compaction		
	6-4-4	Pollard*	3	D--Sand-Clay Tests		
	6-4-5	McCullough*	3	E--Ind. Sand-Clay		
	6-4-6	Yoder & Irick*	5	F--Rigid Pavement on Gran. Base	813	
46	5-6			Conc. Pvt. Design & Durab.		
	5-6-1			A--Deflection Stud.(see C-36A)		
	5-6-2	Shelburne* & Woods	2	B--Blowup Survey-Perf.		
	5-6-3	Hittle*	1	C--Thin Pvt. Surv.		
	5-6-4	Lewis*	2	D--Resurf. Pvt. Surv.		
	5-6-5	Lewis*	1	E--Joint Perf. Surv.		
	5-6-6	Lewis*	1	F--Id. Trans. Device		
	5-6-7	Camp*	1	G--Conc. Exp.		
	5-6-8	Melville*	1	H--Conc. Exp.		
	5-6-9	Okamoto*	1	I--Freeze & Thaw		
	5-6-11	Lewis*	1	J--Resurvey of Blowups		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
	5-6-12	Schnebeli*				
		Thoma & Lewis*	5	K--Strain Gauges		
	5-6-13	Choksi*	2	L--Structural Design		
	5-6-14	Miller	5	M--Theoretical Strains & Stresses	810	
	5-7	Slate*		Chemistry of Concrete		
47	5-7-1		3	A--Gels		
	5-7-2		3	B--Thin Sections		
	5-7-3	Dolch	5	C--Conc. Aggr.		
	5-7-5	Slate*	2	D--Bibliography		
	5-7-6	Fox*	2	E--Thermal		
	5-7-7	Dolch	5	F--Aggr. Voids	822	417P,427
48	16-6	Yoder	2	Turf Studies		
49		Hittle*	1	Load-Carrying Capacity		
50				Soil Stabilization		
	6-5	Slosser*	1	A--Chemicals		
		Hills*	1	B--Molasses		
	10-47	Johnson*				
		Dolch & Yoder	1	C--Lime		
	6-5-1	Sharma*	2	D--Bibliography		
	10-19-2	Korman*	2	E--Soil Cal. Chloride Mix		
51	6-6	Parvis, Montano* Yeh, Magnusson*		Soil-Drain. Maps		
	17-5-1D	Parvis, Yeh, Magnusson*	5	A--Drng. Maps	797,798,801 811 839	421P
	6-6	Montano* and Others, Yeh	5	B--Soil Maps	807	
	6-6-12	Moultrop*	2	C--Loess		
	6-6-11	McLerran*	2	D--SWInc. Interbedded Shale & SS Mtls.		
	6-6-21	Montano*	3	E--Soil Map of Le Grange Co.		
	6-6-24	Stylianopoulos*	2	F--SS & Shale of SW Ind.	808	412P
	6-6-25	Robbins*	5	G--Limestone & Shale of SE Ind.		
	6-6-26	Leighty*	2	H--Aluvial Terraces		
	6-6-28	McGregor*	2	I--Agricultural Soil Maps	825,846	419P
	6-6	Yeh	5	J--State Drainage Map		
52	8-8-1		5	Pav't. Design		
	6-2-1-6	Ardaman* & Yoder	2	A--C.B.R. tests		423P
	13-2	Frost	2	B--US 31 Test Sections (Movies)		
3				Road Roughness & Skid		
	9-3-3	Metcalf*, Thanos* Holloway*	2	A--Equipment		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
	9-3-4	McLaughlin, Grunau*, Baerwald	2	B--Skid Resistance		
	8-15	Various	5	D--US 31 Test Rd.		
	8-15-1	Grunau* & Michael	5	E--Skid Resistance of US 31 Test Rd.	791,835	
	8-15-2	Rosenfield*	5	F--Lateral Placement of US31 Test Rd.	788	
	9-3-4-1	Grunau* Michael	2	G--Skidding Characteristics	829	401P
	8-17	Grunau*	5	H--Skid tests on US421	833	
	9-3-3-1	Holloway	2	I--Roughness Characteristics	781,789, 836,845	418P
54	3-1			Econ. & Admin.		
	3-2	Michael	3	A--Laf. Trans. Sys.		
	3-3	May*	2	B--Lebanon Bypass		
	3-4	Michael	2	C--Kokomo Study		
	3-1-2-1	Baerwald*	2	D--Public Opin. Poll Secondary Roads		
	3-1-2	Branham Baerwald*	5	E--Co. Trans. Prob.		428P
	3-5	Branham Baerwald*	3	F--Cost Allocation		
	3-6	May* & Yoder	3	G--Air Transportation		
	3-2-1	May*	3	H--Gr.Laf. Trans. St.		
	3-7	May*	2	I--Logansport Study		
	3-8	Michael	2	J--Richmond Study		
	3-9	Michael	3	K--Bloomington Study		
	3-7-1	Bauer*	3	L--Logansport Park. St.		
	3-7-2	Kell	2	M--O-D Surv. Methods		
	3-10	Stoner*, Petty, Woods & Branham	2	N--Co. Hwy. Admin.		
	3-11	Miller*	2	O-Sampling Techniques		
	3-12	Baerwald*	2	P--Hwy. Class. & Ratings	795,837	411P,422
	3-13	Michael & Edwards*	2	Q--Huntington Survey		
	3-12-1	Baerwald*	2	R--Allen Co. Road Needs	796	425P
	3-14	Branham	2	S--Recruitment of Engineers		
	3-15	Michael	5	T--State Highway Needs Study	782,814,832	
	3-16	May*	2	U-Evaluation of Limited Access Highways		424P, 4
	3-17	Barr	2	V--Urban Characteristics for D-D Surveys	784,812	413P
55				Flex. Pavements		
	2-7-1	Goetz	5	A--General		
	2-7	Lowrie*	2	B--Design		
	2-7-2	Metcalf*	3	C--Test Road		
	2-7-3	Herrin*	3	D--Thickness Design		

Project C-36	File No.	Assigned to	Status (See Key)	Title of Project	Board Report No.	Publication Numbers
	2-7-4	McLaughlin & Goetz	2	E--Bitum. Conc. Design		
66				Bridges		
	8-7-1	McCammon*	3	A--Dynamic Forces		
	8-7-2	Hayes, Sbarounis*	2	B--Vibration		435P
	8-7-3	Dolch	3	C--Ice Control		
	8-7-4	Miles	3	D--Topographic Mapping		
	8-7-5	Wyly	3	E--Des. of Washers for High Tensile Bolts		
67				Cement		
	4-5	Blackburn	1	A--Slag Cement		
68	5-9-1	Midgaard	5	A--Creep & Shrinkage	824	
	5-9-2	Nordby	6	B--Endurance		
C-36A	8-12	Geldmacher, Anderson, Dunkin	5	Highway Deflection	780,787 800,805 806,815 816,817 820,841 842,843	

LISTINGS OF RESEARCH PROJECTS AND FUNDS IN JOINT HIGHWAY RESEARCH PROJECT AREA

Fund No.	Project No.	Fund Name	Sponsor	Date Began	Date Completed	Total Funds To Date	Funds 1955-1956
5112	C-36	Indiana State Highway	Indiana State Highway	1936	Inc.	$1,566,793.51	$150,000.00
5112A	C-36A	Instr. on Pvt. Defl.	Ind. State Highway-BPR	1953	Inc.	40,000.00	20,000.00
5201	C-146	International Salt Co. Res.	International Salt Co.	1955	Inc.	4,000.00	2,700.00
5249	C-154	Fly Ash Research	Ind. Electric Assoc.	1956	Inc.	6,000.00	
5411		EES, Newport Industries	Newport Industries	1948	1949	1,000.00	
5411	C-138	EES, Traffic Eng. Services	Allen County, Ind.	1954	Inc.	1,406.25	400.00
5661	C-56	Cal. Chloride Assn. Fellowship	Cal. Chloride Assn.	1940	1947	7,182.89	
5682		Purdue Airport Runway Project	Engineering Exp. Sta. Purdue	1942	1943	296.00	
5678	C-44	Fed. Research C.A.A. No. 1	Civil Aeronautics Adm.	1942	1944	6,000.00	
5683	C-45	Fed. Research C.A.A. No. 2	Civil Aeronautics Adm.	1943	1946	62,800.00	
5722	C-58	Fed. Res. Permafrost Invest. #1	Civil Aeronautics Adm.	1945	1950	107,500.00	

Fund No.	Project No.	Fund Name	Sponsor	Date Began	Date Completed	Total Funds To Date	Total Funds 1955-1956
5731		Standard Oil Fellowship	Standard Oil Co.	1946	1948	$ 1,500.00	
5761	C-68	PRF #371A (Turf)	U.S.C.E., Ohio River Division	1947	1949	2,319.00	
5775		PRF #422A (Turf)	U.S.C.E., Ohio River Division	1947	1947	945.00	
5777	C-73	Lime-Soil Research	National Lime Asso.	1948	1954	21,500.00	
	C-75	PRF Gen. (Purdue Airport)	Purdue Research Found., Engineering Exp. Sta.	1948	1949	2,000.00	
5796	C-76	A.A.R. Conc. Research	Assn. of American Railroads	1949	Inc.	54,000.00	8,900.00
5805	C-84	Fed. Res. Permafrost Invest. #2	Civil Aeronautics Adm.	1949	1952	15,000.00	
5806	C-85	Fed. Res. Traffica-bility Study	U.S.C.E., St. Paul Dist. and Vicksburg	1949	1952	55,000.00	
5807	C-86	Fed. Res. Site Selection Study	U.S.C.E., St. Paul Dist. and Vicksburg	1949	1952	20,000.00	
5808	C-87	Fed. Res. Aerial Reconnaisance	U.S.C.E., St. Paul Dist. and Vicksburg	1949	1952	60,000.00	
5822	C-89	PRF #578 (Numerical Solutions-Water Flow)	Purdue Research Found.	1950	1951	1,700.00	
5833	C-91	F.R. Waterways Expt. Sta. Res.	U.S.C.E., W.E.S., Vicksburg	1950	1952	5,100.00	

Fund No.	Project No.	Fund Name	Sponsor	Date Began	Date Completed	Total Funds To Date	Total Funds 1955-1956
5842	C-90	Cal. Chloride Soils Res.	Cal. Chloride Assn.	1950	1954	$ 6,000.00	
5843	C-94	Dow Chemical Conc. Res.	Dow Chemical Corps	1950	1952	5,500.00	
5866	C-104	Soils Strength Characteristics	American Steel Dredge Co.	1951	1952	10,000.00	
5869	C-105	Fed. Res. Predic. Traffic.	U.S.C.E., W.E.S. Vicksburg	1951	1953	22,000.00	
5870	C-106	Fed. Res. Airphoto Traffic	U.S.C.E., W.E.S. Vicksburg	1951	Inc.	158,000.00	$28,000.00
5878	C-108	PRF #796 (Rubber-Asphalt)	U.S. Air Force Wright Field	1952	1955	15,662.80	
5883	C-109	Permafrost Report Publication	U.S.C.E., SIPRE, Chicago	1952	1953	1,289.00	
5893	C-111	Amer. Steel Dredge Res.	Amer. Steel Dredge Co.	1952	1953	5,000.00	
5926	C-122	PRF #927 (Base Course)	U.S.C.E., New England Division	1953	Inc.	57,000.00	28,000.00
5934	C-124	PRF #953 (Scale Season)	U.S. Air Force, Wright Field	1953	1956	55,000.00	8,000.00
5935	C-125	PRF #954 (Manuals)	U. S. Army Map Service	1953	1955	64,099.91	
5936	C-126	Fed. Res. Freezing Characteristics	U.S.C.E., SIPRE Chicago	1953	Inc.	22,975.00	6,000.00

Fund No.	Project No.	Fund Name	Sponsor	Date Began	Date Completed	Total Funds To Date	Total Funds 1955-1956
5939	C-127	Yuma Test Branch Terrain Study	U.S.C.E., W.E.S., Vicksburg	1953	1955	25,000.00	
5940	C-128	Engineering Physiography of N.A.	U.S.C.E., W.E.S., Vicksburg	1953	1953	1,656.00	
5955	C-133	Bakelite Co. Res.	Bakelite Co.	1953	Inc.	15,000.00	$10,000.00
5964	C-139	National Sand and Gravel Fellowship	National Sand and Gravel Assn.	1954	1956	2,000.00	1,500 00

SUMMARY

From Indiana State Highway	$1,566,793.51	$150,000.00
From Other Sources	941,431.85	113,500.00
Total	$2,508,225.36	$263,500.00

LISTING OF CODE NUMBERS FOR PROJECTS OTHER THAN FUND 5112
AS SHOWN IN ATTACHED LISTING OF EXTRA LABOR EMPLOYEES
OF THE JOINT HIGHWAY RESEARCH PROJECT

Code Number	Fund Number	Fund Name
1		Work on contracts for CAA
1a	5689	Fed. Res. CAA #2
1b	5678	Fed. Res. CAA #1
2	5691	Cal. Chloride Association
3	5722	Fed. Res. Permafrost Investigation
4	5761	PRF Fellowship No. 371A
5	5777	Lime-Soil Research
6	5785	AAR Concrete Research
7	5805	Fed. Res. Permafrost Investigation #2
8	5806	Fed. Res. Trafficability Study
9	5807	Fed. Res. Site Selection
10	5808	Fed. Res. Aerial Reconnaissance
11	5822	PRF Fellowship No. 578
12	5833	Waterways Experiment Station Research
13	5842	Calcium Chloride Soils Research
14	5843	Dow Chemical Concrete Research
15	5866	Soil Strength Characteristics
16	5869	Fed. Res. Prediction Trafficability
17	5870	Fed. Res. Airphoto Trafficability
18	5878	PRF Fellowship No. 796
19	5883	Permafrost Report Publication
20	5893	American Steel Dredge Research #2
21	4414	Conference 4414 (Technical Extension Div.) Short Course--Airphotos
22	5411	Fees -- EES

23		State Highway Commission payrolls for the production of drainage and soil maps.
24		State Highway Commission payrolls covering the transportation surveys.
25	5411	Traffic Engineering Services
26	5112A	Indiana State Highway 5112A
27	5926	PRF #927
28	5934	PRF #953
29	5935	PRF #954
30	5936	Fed. Res. Soil Freezing Characteristics
31	5939	Yuma Test Branch Terrain Study
32	5940	Engineering Physiography of North America
33	5955	Bakelite Water Barrier
34	5201	International Salt Company

EXTRA LABOR EXPLOYEES

Supplement No. 2*

Termination Between July 1, 1955 and June 30, 1956

Employee	Work on other Projects	Employed	Resigned
Aman, Mohammed	6	9-16-55	2-14-56
Anene, E. O.		12-16-54	5-31-56
Araya, A.		4-16-55	7-1-55
Arnold, G. L.		11-1-55	11-14-55
Austin, Lorraine		11-1-55	12-14-55
Billiu, Charles		3-1-55	7-1-55
Bradley, B. R.	27, 33	1-1-56	5-31-56
Burgard, W. C.		6-1-55	10-31-55
Butler, David A.	6, C.E.	6-16-55	9-15-55
Calvert, D. E.		10-16-55	4-15-56
Carpenter, Daniel A.	28	7-16-55	12-14-55
Cobb, John		11-16-54	5-15-56
Cole, Lulu Belle		8-16-55	8-31-55
Congleton, Helen		12-15-55	2-29-56
Davis, Norman L.		10-1-54	7-1-55
Dean, P. B.	27, 17, 30	1-1-56	5-31-56
Edwards, J. B.		11-1-55	5-15-56
Fang, H. Y.		2-16-55	5-31-56
Gadbury, James A.		9-16-55	12-14-55
Gifford, Lincoln S., Jr.	30	9-16-53	1-31-56
Golden, Joe		6-1-56	6-30-56
Halus, N. A.	C. E.	11-1-55	5-15-56
Han, Thou Yu		12-15-55	1-31-56
Hankins, William		7-1-55	8-15-55
Harlan, Raymond F.	28	12-16-53	5-15-56
Haycraft, Anna		11-15-55	2-14-56
Henning, Robert J.	28	7-16-54	5-31-56
Hesch, Harold		11-1-55	1-14-56
Hutchinson, S. F.		8-1-55	8-15-55
Karst, Robert E.		4-1-56	4-14-56
Kline, Beatrice		12-15-55	12-31-55
Kohsi, Paul		11-15-55	1-31-56
LaSalle, Richard M.		7-16-55	7-31-55
Lee, Robert	27, 30, 33, 17, C.E.	1-1-56	5-15-56
Lucus, Gerald E.		4-15-56	5-31-56
Luther, H. Daniel		9-16-54	7-1-55
McGuire, J. G.		3-1-55	7-1-55
McWhirter, Don A.		3-1-55	3-31-55
Menghistu, H. S.	6	8-1-55	9-15-55
Middleton, R. L.		2-1-55	5-31-56
Monahan, R. E.		7-1-56	7-16-56
Ogden, Don	17,27	3-1-56	5-31-56
Pinegar, Paul		10-1-54	1-31-56
Prozan, R. J.		9-16-55	4-30-56
Raymond, Murray R.	17, 6, 31, 28, 29, 27	4-3-52	7-1-55
Reasner, R.		10-16-55	11-30-55
Rinker, Jack N.	17, 28	10-16-54	4-14-56

Robinson, Thomas M.		4-1-56	4-14-56
Rowlands, Brian H.	27, 33, 6	7-16-55	8-31-55
Scherschel, Ralph A.	30, 27, 33	6-1-55	8-31-55
Selle, Eleanor	28	6-16-55	8-31-55
Shen, John C. U.		8-1-55	9-15-55
Shrack, James L.		6-1-55	7-31-55
Smith, Maude		11-15-55	2-29-56
Snell, R. D.		11-1-55	11-15-55
Sprague, Spencer		3-16-55	7-1-55
Sutton, Jim	6	9-1-55	5-31-56
Tarabishi, Haidar		7-1-55	8-31-55
Terrel, Ronald L.	27, 17	3-1-56	5-31-56
Titus, Richard	30, 33, 27, 34, C.E.	6-16-55	3-31-56
Tuthill, Robert H.		10-16-54	7-1-55
Wandel, C. T.		10-16-55	12-31-55
Watson, Nancy	28	3-1-55	9-15-55
Yuen, Herbert M. C.		6-1-55	8-31-55
Zukowski, Ronald	28	6-1-55	10-15-55

* For listing of all terminations prior to July 1, 1954, see the "Annual Report of the Associate Director for 1953-54". For terminations between July 1, 1954 and June 30, 1955, see the "Annual Report of the Assistant Director for 1954-1955".

Still Employed on July 1, 1956

Employee	Work on other Projects	Employed	Resigned
Kenyon, John W.	6	9-16-54	
Messenger, Frank	34, 17, 33, 27	8-1-55	
Park, Roger		6-1-56	
Peeler, Donald L.		2-1-55	
Purdue, R. E.		2-16-55	
Reed, Merwyn O.	17, 33, 28	11-16-53	
Rinker, Betty	28	5-16-55	
Schory, Gene P.		2-1-56	
Shepherd, Edna Violet		11-15-55	
Stark, Philip J.	17	2-1-56	
Thorud, Ingolf		5-1-56	
Triece, Samuel	28	8-1-55	
Witek, Lawrence	27, 33, 34, 30, C.E.	3-1-55	
Woo, John H.		6-1-56	